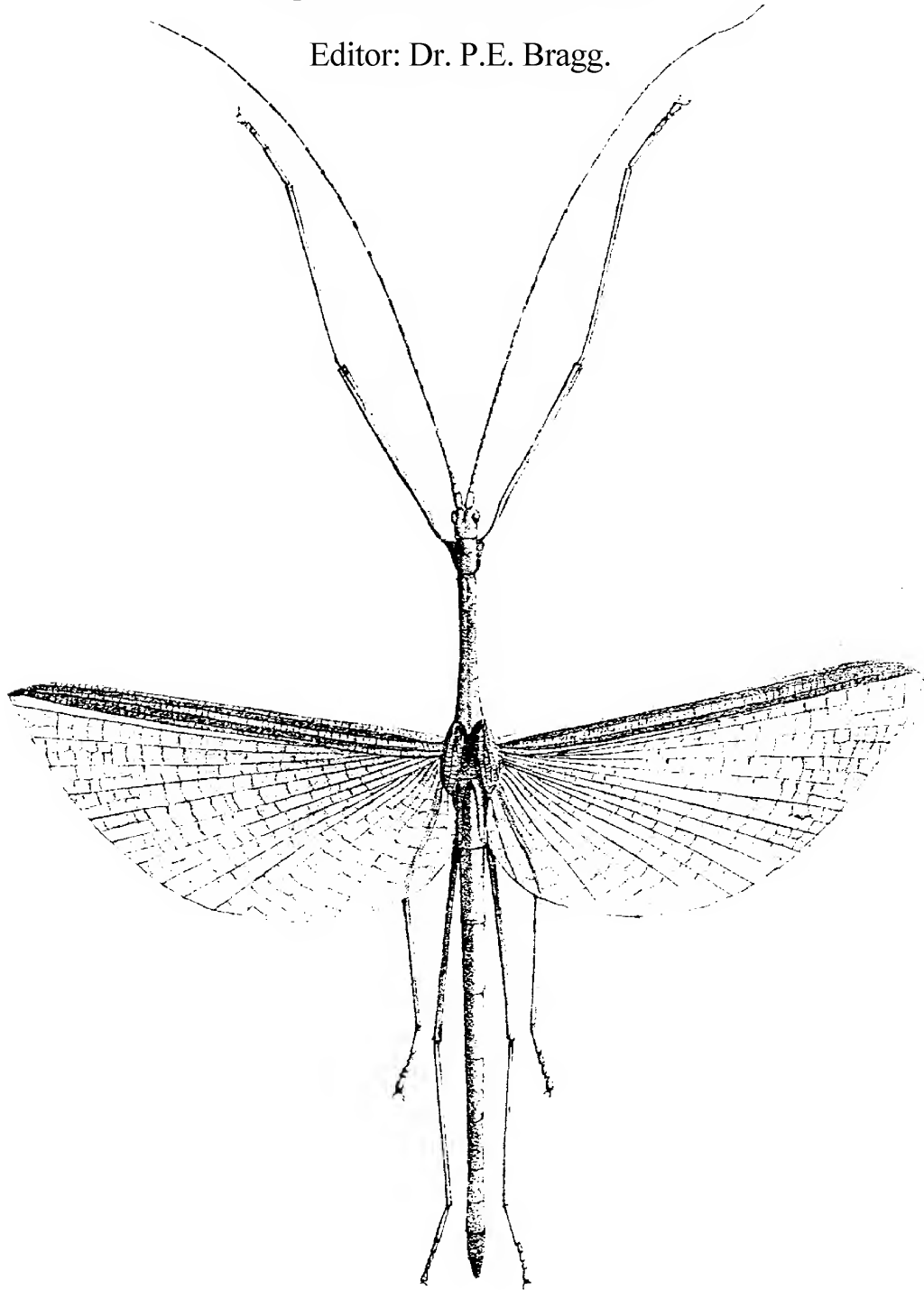


PHASMID STUDIES

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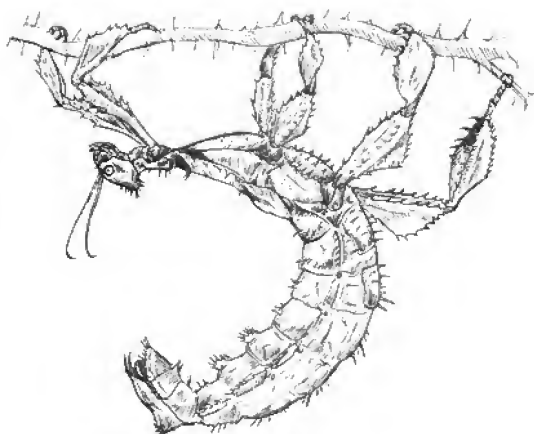
Editor: Dr. P.E. Bragg.



Produced by the Phasmid Study Group

The Phasmid Study Group.

The Phasmid Study Group (PSG) was formed in 1980 to foster the study of phasmids. The group currently has several hundred members worldwide. The membership ranges from young children to professional entomologists. The PSG holds regular meetings and presents displays at all the major entomological exhibitions in the U.K. The PSG places emphasis on study by rearing and captive breeding and has a panel of breeders who distribute livestock to other members. The PSG produces two publications which are issued free to members.



The Phasmid Study Group Newsletter is issued quarterly and contains news items, livestock information, details of exhibitions and meetings, and a variety of short articles on all aspects of phasmids.

Phasmid Studies is issued on-line and in print. Typically it is produced biannually, in March and September. It contains longer articles on all aspects of phasmids, with an emphasis on natural history, captive breeding, taxonomy, and behavioural studies. Each issue contains abstracts of papers from other recent publications. Electronic copies of *Phasmid Studies* are deposited in the following libraries: British Library, U.K.; Hope Library, Oxford University Museum of Natural History, UK; Nottingham University Library, UK.

Details of membership may be obtained from the **Treasurer and Membership Secretary, Paul Brock, "Papillon", 40 Thorndike Road, Slough, Berks, SL2 1SR, U.K.**

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This is a Dutch-Belgian group with similar aims to the Phasmid Study Group. It produces a quarterly newsletter, *Phasma*, which is published in Dutch. Regular meetings are held in Belgium or the Netherlands.

Details of *Phasma* may be obtained from **Kristien Rabaey, Nieuwpoortkeiweg 39, B-8630 Veurne, Belgium.**

Contributions

1. Articles are welcome from anyone and the editor is prepared to offer advice and help to contributors. The editor would like to encourage people with no previous experience to write articles for *Phasmid Studies*.
2. Articles are reviewed by independent referees at the discretion of the editor.
3. Articles are accepted for publication in *Phasmid Studies* on the understanding that they may be translated and reproduced in *Phasma*.
4. Authors will be provided with a pdf file of their paper for distribution.
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Instructions to authors

Articles for publication in *Phasmid Studies* may be submitted in printed form or by email, however if submitted by email authors are advised to contact the editor in advance. Refer to a recent copy of *Phasmid Studies* for layout of articles. In particular the following points should be noted.

1. The title should be followed by the author(s) name and address, an abstract, a list of key words, an introduction (if necessary), the main article, and finally a list of references.
2. The abstract should briefly summarise the article. For short articles one or two sentences should suffice; for longer articles the abstract should not exceed 400 words.
3. A list of key words should be given. These should cover the main topics in the article but there should not be more than 25 key words.
4. All titles and headings should be in bold print and not underlined. The main title and all side-headings should be aligned on the left hand side of the page. If the article is lengthy major headings may be created by using centred headings in bold print.
5. Paragraphs should be indented using a single tab setting (not character spaces).
6. The full stop at the end of sentences should be followed by a **double** space. Full stops not at the end of a sentence should be followed by a single space.
7. Scientific names should be in italics. On the first usage names should be given in full, followed by the name of the author. On subsequent occasions the genus should be abbreviated to a single letter followed by a full stop, and the author should be omitted.
8. English, not American, spellings should be used throughout.
9. Numbers between one and ten should be spelled out while numerals should be used for 11 and above; the exceptions to this are where measurements are involved, or in descriptions of insects, in both cases numerals may be used throughout.
10. Where measurements are given a space should not be left between numerals and units e.g. 6mm, not 6 mm.
11. References in the text should include the author and date, and page number if appropriate, these should be given in the form Smith (1982: 123), or (Smith, 1982: 123). In the references section, the names of authors and the volume numbers of journals should be printed in bold. Journal titles and book titles should be given **in full** (not abbreviated) and should be printed in italics.
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17. If the word processor used does not have a table facility then tables of measurements etc. should be laid out using tab settings (not character spaces).
18. Where museums are abbreviated standard codens should be used, as defined in Arnett, R.H., Samuelson, G.A. & Nishida, G.M. (1993) *The insect and spider collections of the world*. [second edition] Sandhill Crane Press, Gainesville, Florida. [Codens are available online at <http://hbs.bishopmuseum.org/codens/>].

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Volume 16, numbers 1 & 2.

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Biographies of Phasmatologists – 3. Hermann Burmeister. **P.E. Bragg, 8 The Lane, Aysworth, Nottinghamshire, NG16 2QP, U.K.**

Abstract

Karl Hermann Konrad Burmeister was a German zoologist and entomologist. His life and phasmid work are outlined. Although he published over 75 entomological papers, only *Handbuch der Entomologie* (1838) included any work on phasmids. Burmeister's phasmid work was limited but important in historical terms. He described one new genus, renamed a second, and described 32 new species: a significant number at that time.

Key words

Phasmida, Phasmatologist, Hermann Burmeister, Biography.

Hermann Burmeister (1807-1892)

Karl Hermann Konrad Burmeister, usually known as Hermann Burmeister, was a German zoologist and entomologist. He was the son of a Customs official and was born in Stralsund, Germany, on 15th January 1807.

He studied at the University of Greifswald in 1826 and the University of Halle from 1827-1829 studying Science and Medicine. He developed an acquaintance with Alexander von Humboldt (brother of Wilhelm von Humboldt, founder of Berlin University), and in Berlin he qualified to teach at university level. In 1837, Burmeister was appointed "Professor Extraordinary" at the University of Halle and progressed to Professor of Zoology in 1842. Burmeister remained in Halle from 1837 until 1861. In 1848 he was chosen as a member of the Berlin parliament, but resigned due to ill health.

Through the support of Alexander von Humboldt, Burmeister travelled to Brazil where he studied natural history in the states of Minas Gerais and Rio de Janeiro from September 1850 to March 1852; the journey was, at least in part, in the hope of a warmer climate improving his health.

In 1853 the introduction to the translation of one of his papers said "he now ranks as one of the most eminent and popular teachers in Germany" (New York Evening Post, 1853). In late 1856, Burmeister visited Argentina and Uruguay returning to Germany with zoological collections. In 1861 he went to live in Argentina, but it was a time of political unrest, and he found his appointment to the museum in Buenos Aires had been revoked by the new government minister. The political unrest in the country was resolved, and in February 1862 he became the Director of the National Museum of Natural History in Buenos Aires where he worked for thirty years. His death on 2nd May 1892 resulted from a failure to recover from injuries sustained when he fell down a staircase.



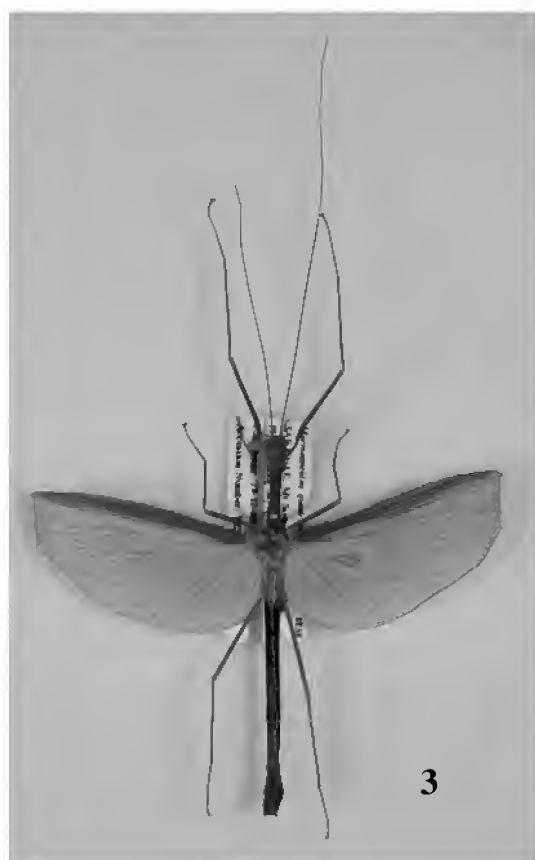


Figure 3.
Marmessoidea quadriguttata – Male.

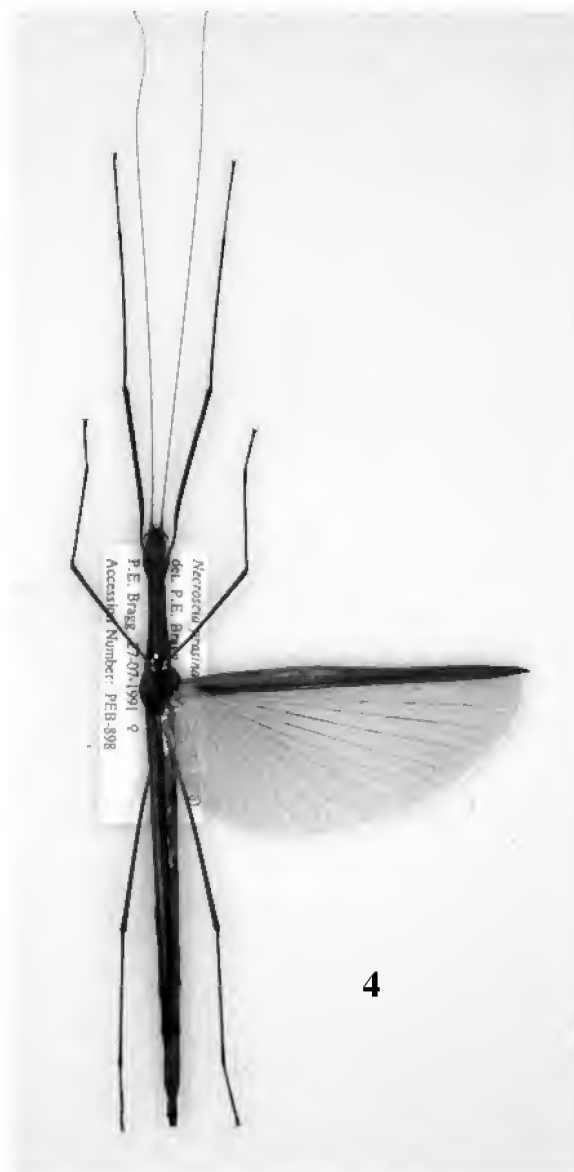


Figure 4.
Necroscia prasina – Female.

Burmeister was a naturalist with a wide range of interests including entomology, palaeontology, ornithology, geology, and meteorology. He was an opponent of Darwin & Wallace's theory of evolution. He seems to have been a difficult person both to work with, and live with; he was described as "a very distinguished man of knowledge, but as a man he has his weaknesses -lack of amiability and tact, and too much appreciation of himself. Moreover, he is unhappily married, which adds a dry and brusque aspect to his character" (Gülich *in* Auza, 1996: 138).

His appointment to Buenos Aires museum was viewed as a sign of respectability for Science in Argentina, but over time there developed a feeling amongst some that he was too self-centred; he certainly caused difficulties for many other scientists. He established the museum's journal, *Anales del Museo Público*, but prevented anyone else from publishing in it; the single exception was one article by his son, Carlos, who worked for the museum as a travelling naturalist. There were also disagreements about who had the intellectual rights to results obtained by naturalists at the new Córdoba Academy of Exact Sciences; Burmeister had been appointed as scientific director and insisted everything was published under his name: several professors resigned. Much of his work in Argentina was on palaeontology, and he also described many new species of a variety of animals.

In addition to his many publications on palaeontology, Burmeister published over 75 entomological papers; his entomological research dealt primarily with Coleoptera. Burmeister provided a review of the classification and taxonomy of insects in his five volume *Handbuch der Entomologie* (1832-1847) which was said to “embrace the results of fifteen years of devoted study to the subject” (New York Evening Post, 1853); that was his only publication to deal with phasmids.

586 **Zweite Ordnung. Käuferfe (Gymnognatha).**

cc. Ohne eigentlichen Höcker und ohne Stacheln auf den Flügeldecken. —

8. *Ph. prasinum**: viride, unicolor; alarum area postica incarnata; mesonoto granulato, linea media nec non utrinque laterali elevata. Long. 2" 4".

Von Java und Borneo, durch Herrn de Haan nach Berlin und Halle gesendet.

B. Ohne Nebenaugen. —

Die Arten dieser Sektion haben einen glatten kugeligen Kopf, dessen Scheitel gewölbt und höher ist als der Prothorax; einen sehr dünnen, zierlichen allermeist etwas körnigen Mesothorax, und zierliche schlanke Beine. Sie bewohnen sämtlich, so viele mir bekannt wurden, Ostindien, Java, Borneo und Sumatra.

a. Flügeldecken kurz, auf der Mitte ziemlich merklich erhaben.

9. *Ph. 4guttatum**: viride, elytris guttis 4 sulphureis; alarum area postica purpurea. Long. ♂. 1" 10", ♀. 3".

Von Borneo.

Figure 5. The upper half of page 586 of *Handbuch der Entomologie*.

Work on phasmids

Burmeister did not do much work on phasmids. His importance as a phasmatologist is largely due to his work having been done in the very early days of Linnean taxonomy, when very common species were still undescribed. His phasmids are described in part one of volume two of *Handbuch der Entomologie* (Burmeister, 1838); part two of volume two was published in 1839. Although he only describes one new genus and 32 new species, some of the species are well-known, and quite common species, e.g. *Phobaeticus acanthopus* (Burmeister). Figure 3 shows the top half of page 586, giving Burmeister's descriptions of *Phasma prasinum* and *Phasma 4guttatum*, now known as *Necroscia prasina* (Burmeister), and *Marmessoidea quadriguttata* (Burmeister). I have included photographs of these two species (figs 3 and 4).

He described *Bacunculus*, on page 566, as a new sub-genus of *Bacteria*; subsequently it has been treated as a genus. On page 576, Burmeister renamed *Aplopus* Gray, 1835 as

Haplopus because he (incorrectly) considered Gray's name to be wrongly formed. Zompro (2005) recently clarified the confusion surrounding *Aplopus* and *Haplopus*.

Burmeister's 32 new species names (with page numbers)

<i>2guttatum</i> (<i>Phasma</i>)586.	<i>gracilis</i> (<i>Bacillus</i>)561.
<i>4guttatum</i> (<i>Phasma</i>)586.	<i>hastata</i> (<i>Bacteria</i>)567.
<i>acanthomera</i> (<i>Cyphocrania</i>)579.	<i>lichenale</i> (<i>Phasma</i>)584.
<i>acanthopus</i> (<i>Bacteria</i>)565.	<i>longicornis</i> (<i>Cladoxerus</i>)572.
<i>aurita</i> (<i>Bacteria</i>)565.	<i>muricata</i> (<i>Bacteria</i>)564.
<i>auritus</i> (<i>Acanthoderus</i>)569.	<i>ornatum</i> (<i>Phasma</i>)585.
<i>bis-2guttatum</i> (<i>Phasma</i>)586.	<i>prasinum</i> (<i>Phasma</i>)586.
<i>brevipenne</i> (<i>Phasma</i>)584.	<i>scabrosus</i> (<i>Acanthoderus</i>)569.
<i>brevis</i> (<i>Bacillus</i>)562.	<i>spatulata</i> (<i>Bacteria</i>)566.
<i>calcarata</i> (<i>Bacteria</i>)566.	<i>spiniceps</i> (<i>Prisopus</i>)588.
<i>ceratophyllus</i> (<i>Haplopus</i>)577.	<i>spinicolle</i> (<i>Phasma</i>)585.
<i>cornutus</i> (<i>Acanthoderus</i>)569.	<i>spinicollis</i> (<i>Prisopus</i>)588.
<i>eucnemis</i> (<i>Haplopus</i>)577.	<i>spinosa</i> (<i>Bacteria</i>)567.
<i>ferula</i> (<i>Bacteria</i>)564.	<i>striata</i> (<i>Bacteria</i>)567.
<i>gibbosa</i> (<i>Diapherodes</i>)575.	<i>tridens</i> (<i>Bacteria</i>)567.
<i>gracilis</i> (<i>Bacteria</i>)567.	<i>venosum</i> (<i>Phasma</i>)585.

Although many of Burmeister's collections are in the museum at Martin Luther University, Halle (MLUH), his phasmid work was done in Berlin and consequently most of these specimens are in the museum at Humbolt University, Berlin (ZMHB). He did not illustrate any of his phasmids and the text is difficult to read because it is printed in a gothic font (see fig. 5).

References

- Auza, N.T.** (1996) "Germán Burmeister y la Sociedad Paleontológica, 1866-1868", *Investigaciones y ensayos*, **46**: 137-155.
- Burmeister, H. (1838)** *Handbuch der Entomologie*, Volume 2. Berlin.
- New York Evening Post (1853)** The Black Man. The comparative anatomy and psychology of the African Nigro.
- Zompro, O. (2005)** *Haplopus* Burmeister, 1838, replacement name for *Aplopus* Gray, 1835 (Phasmatodea). *Phasmid Studies*, 13(1&2): 30.

Biographies of Phasmatologists – 4. William Forsell Kirby.

P.E. Bragg, 8 The Lane, Awsworth, Nottinghamshire, NG16 2QP, U.K.

Abstract

William Forsell Kirby (1844-1912) was an English entomologist and folklorist. His life and phasmid work is outlined. He described 70 species and 22 genera of phasmids. His *Synonymic Catalogue of Orthoptera* was a complete catalogue of world species that has served phasmatologists for 100 years.

Key words

Phasmida, Phasmatologist, William Forsell Kirby, Biography.

William Forsell Kirby (1844-1912)

William Forsell Kirby, an English entomologist and folklorist, was born in Leicester on 14th January 1844. The son of Samuel Kirby a banker, and his wife Lydia Forsell, he was educated privately, and became interested in butterflies and moths at an early age. After his father died and the family had moved, he joined the Brighton and Sussex Entomological Society. His first published entomological article was in the *Entomologist's Weekly Intelligencer* in 1856. In 1860 he moved and took up a job in London. He was elected as a fellow of the Entomological Society of London in 1861; in later years he was Secretary of the Society. He published a small *Manual of European Butterflies* in 1862 and became acquainted with various famous entomologists, including J.O. Westwood and H.W. Bates.



Figure 1. William Forsell Kirby.

Kirby spent most of 1866 in Germany where he met Johanna Maria Kappel. They married in 1866 and had one son, William, in 1867. In 1867 he became a curator in the Museum of the Royal Dublin Society (later the National Museum of Science and Art), and produced a *Synonymic Catalogue of Diurnal Lepidoptera* (1871) which made him famous in the world of entomology.

He lived in Dublin from 1867 until his appointment as an Assistant at the British Museum (Natural History) in 1879 where he remained until he retired in 1909. On moving back to London he lived close to his friend H.W. Bates for a while; a few years later, in 1896, he named two species of phasmids after Bates. At the British Museum he worked on various orders of insects. He published several catalogues on different orders of insects including Lepidoptera, Odonata, Hymenoptera and Orthoptera, but also published popular books and articles on Entomology including an *Elementary Text-book of Entomology* (1885). Some of his best-known natural history publications include *Manual of European Butterflies* (1862), *Synonymic Catalogue of Diurnal Lepidoptera* (1871), *Hand-book to the order Lepidoptera* (1897), *Familiar butterflies and moths* (1901), *Butterflies and moths of Europe* (1902-04), and the three volume *Synonymic Catalogue of Orthoptera in the Collection of the British Museum* (1904, 1906, 1910).

Kirby had wide interests and exceptional ability as a linguist and philosopher, publishing on general Natural History, Botany, Evolution, Folklore, Mysticism and poetry. He translated (for the first time directly from Finnish, as opposed to from another language) the Finnish epic, *Kalevala the Land of Heroes* into English in 1907. He had a working knowledge of Finnish, Danish, Dutch, German, Italian, Persian, Portuguese, Russian, Spanish, and Swedish (Kirby, 1912).

Kirby died on 20th November 1912 in Chiswick, after a short illness and is buried in Chiswick Cemetery. An obituary written by his son (Kirby, 1912) reveals that he was considered a kind, modest, humorous and thoughtful man whose “never tiring assistance to all who required help or counsel endeared him to a large circle of friends and acquaintances”.

Phasmid works

Kirby produced 19 publications dealing with phasmids, although that includes his *Elementary Text-book of Entomology* that only deals with the order in general terms but does illustrate two species (Kirby, 1885, plates 21 & 22). Kirby published 22 new genera and 70 species; these are listed below with references to the page number, and plate number for those that were illustrated.

It was rare for Kirby's species to be illustrated, only nine species were illustrated when they were described. This could be due to the cost of hiring an illustrator; Kirby did not do any of the illustrations in his phasmid papers. The illustrators of Kirby's publications were: 1884 (M. Hornman-Fisher), 1885 (not indicated) 1896a (J. Green), 1896c (F.H. Michael), 1900 (M. Hornman-Fisher), 1902b (Howard Knight). Although not illustrated at the time it was originally described, *Clitumnus stilpnoides* Kirby, 1888 was illustrated in Kirby's 1900 paper (as figure 2.1).

On some new or rare Phasmidae in the collection of the British Museum (Kirby, 1896c) is Kirby's most interesting paper in several respects. The introduction gives an overview of phasmid collecting which still rings true today: it is still annoying when specimens are decolourised by collectors putting them in alcohol, they are difficult to collect, and they are still little studied. Kirby reports the phasmid collection as filling 120 cabinet drawers “but will soon require to be extended”; the collection is currently being rearranged, when this is complete it will occupy about 500 drawers (Judith Marshall, pers. com., 2006). Kirby referred to the first species described in the paper as *Pharnacia seratipes* (Gray, 1835) but expressed doubt about the identity. It was later recognised as a distinct species and renamed *Phobaeticus kirbyi* Brunner, 1907. The species, from Borneo, was the largest known phasmid at that time, and is still the largest recorded phasmid, although the description of a longer species, also from Borneo, is currently awaiting publication. Kirby's paper describes two species in the genus “*Hermogenes* Stål, 1875”, in fact this is an error (either by Kirby or perhaps by the printer misreading Kirby's handwriting), the name of the genus should be *Hermagoras* Stål, 1875; Kirby corrected this in his catalogue of 1904. These two species, *H. hosei* and *H. cristatus*, which Kirby said were “Allied” were found to be the same exactly 100 years after they were first described (Bragg, 1996: 38).

His largest publication on phasmids was in volume one of his *Synonymic Catalogue of Orthoptera* (1904c). Pages 317-423 deal with the phasmids and give a complete list of all known references to phasmids. The eight new species names in his catalogue were shown as replacement names using the standard abbreviation n.n. (nomen novum) which nowadays denotes the replacement of a preoccupied name. However, these are actually new species, not replacement names in the accepted sense, because Kirby was giving a new name to specific material that had been misidentified by other authors. In several of these cases he indicated that there were specimens in BMNH so these specimens are syntypes because they were included in the new species designation (IZCN, 1999: Article 72.4). Similarly, of the four

genera marked n.n. in this book, only *Didymuria* was a true replacement name (for the preoccupied *Diura* Gray, 1833), the others were new genera. The 1904 catalogue is important because it designates the type species for quite a few genera. Kirby's first publication that looked at identifying the type species had been published 14 years earlier (Kirby, 1890) but only dealt with genera described prior to 1840.

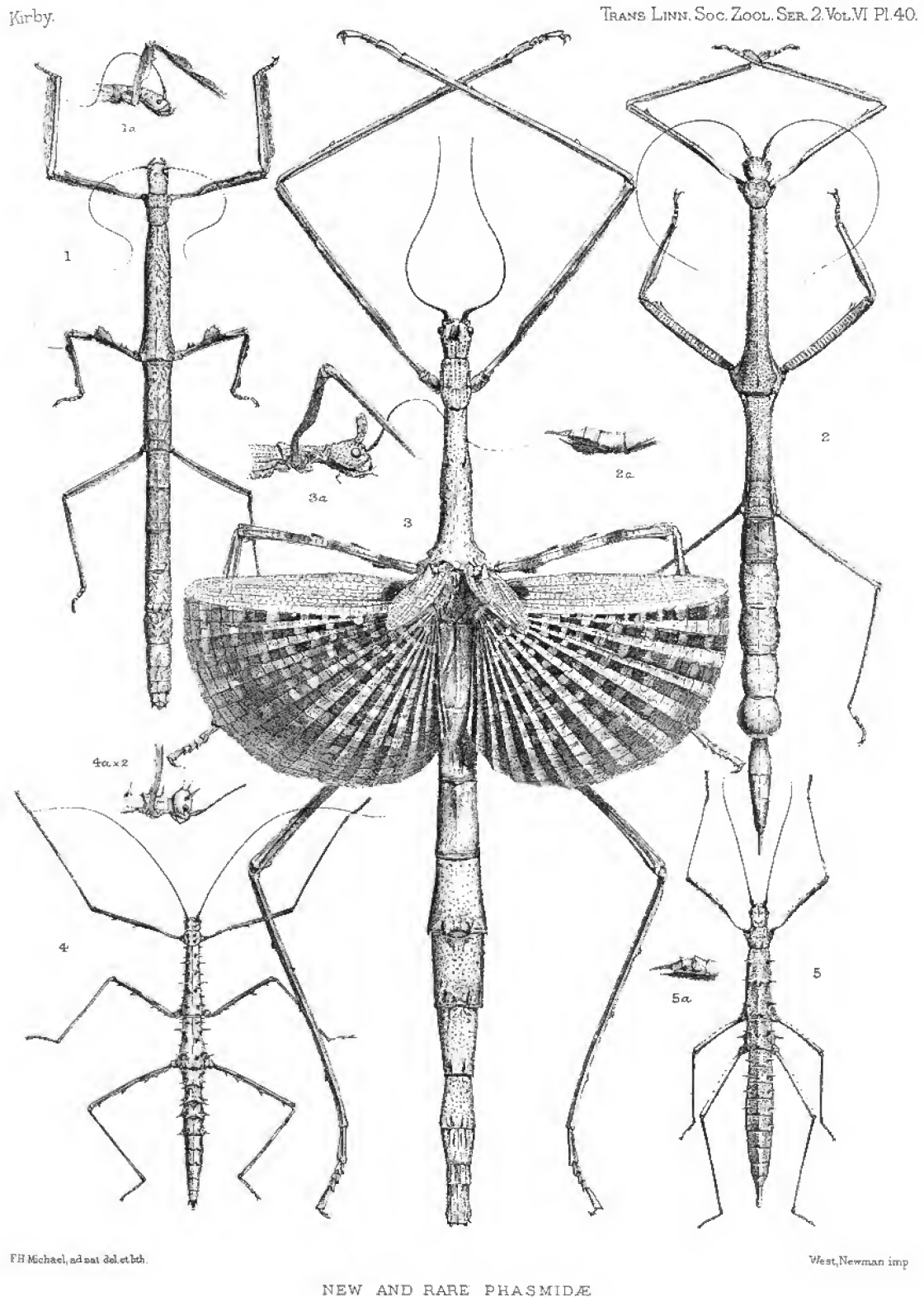


Figure 2. Plate 40 from Kirby's largest phasmid paper of 1896 (Kirby, 1896c).

In 1910 Kirby published the third volume of his *Synonymic Catalogue of Orthoptera* and included one page (p. 569) of corrections to the phasmids. The 1910 volume also includes two interesting notes in Kirby's introduction: "It had been intended to add an Appendix bringing the Catalogue up to date; but this was found to be impracticable, except as regards the third volume; for a Catalogue so largely facilitates work on the groups of which it treats, that it speedily grows out of date, and in many groups treated of in Vols. I. and II. the amount of recent changes and additions has been so large that nothing short of re-editing whole families would be satisfactory." (1910: v) and "Phasmidae. A great monograph on this family has been published by Brunner von Wattenwyl and J. Redtenbacher, *Die Insektenfamilie der Phasmiden*, which supersedes everything previously published on this group."

Alphabetical list of phasmid genera described by Kirby

<i>Abrachia</i>	1889a: 503.	<i>Orthomeria</i>	1904c: 420.
<i>Acanthomima</i>	1904b: 438.	<i>Orthonecroscia</i>	1904b: 436.
<i>Bactricia</i>	1896c: 463.	<i>Phaenopharos</i>	1904b: 433.
<i>Bathycharax</i>	1896a: 259.	<i>Phasgania</i>	1896c: 461.
<i>Chondrostethus</i>	1896c: 455.	<i>Presbistus</i>	1896c: 475.
<i>Didymuria</i>	1904c: 381.	<i>Pseudophasma</i>	1896c: 474.
<i>Enetia</i>	1891: 151.	<i>Staelonchodes</i>	1904a: 372.
<i>Greenia</i>	1896c: 456.	<i>Tersomia</i>	1904a: 431.
<i>Haaniella</i>	1904b: 444.	<i>Trigonophasma</i>	1904b: 436.
<i>Hemipachymorpha</i>	1904c: 341.	<i>Vasilissa</i>	1896c: 468.
<i>Macracantha</i>	1904c: 340.	<i>Xenomaches</i>	1896c: 470.

Lists of Kirby's 70 species grouped alphabetically within each year

1884

moderata (*Necroscia*) 1884: 477, fig. p. 478.

1888

<i>stilpnoides</i> (<i>Clitumnus</i>)	1888: 547.	<i>longiceps</i> (<i>Pseudobacteria</i>)	1889a: 503.
<i>brevicornis</i> (<i>Abrachia</i>)	1889a: 504.	<i>saussurii</i> (<i>Diapheromera</i>)	1889a: 501.
<i>crassus</i> (<i>Pterinoxylus</i>)	1889a: 502.	<i>spinosus</i> (<i>Promachus</i>)	1889b: 230.
<i>insularis</i> (<i>Promachus</i>)	1889b: 231.		

1891

spinosissima (*Enetia*) 1891: 151. |

1896

<i>albopunctatum</i> (<i>Ctenomorpha</i>)	1896c: 472.	<i>moirae</i> (<i>Palophus</i>)	1896b: 463.
<i>australis</i> (<i>Heteropteryx</i>)	1896c: 472.	<i>nigropunctatus</i> (<i>Lonchodes</i>)	1896c: 453.
<i>batesii</i> (<i>Lonchodes</i>)	1896c: 452.	<i>phillipsi</i> (<i>Ischnopoda</i>)	1896c: 467, pl. 40.3.
<i>batesii</i> (<i>Megacrana</i>)	1896c: 471.	<i>sodalis</i> (<i>Dixippus</i>)	1896c: 459.
<i>bogotensis</i> (<i>Stratocles</i>)	1896c: 474.	<i>sordidus</i> (<i>Promachus</i>)	1896c: 463, pl. 40.4.
<i>catori</i> (<i>Lonchodes</i>)	1896c: 454.	<i>spinosissima</i> (<i>Caulonia</i>)	1896c: 464, pl. 40.5.
<i>cornutus</i> (<i>Dixippus</i>)	1896c: 459.	<i>stali</i> (<i>Arrhidaeus</i>)	1896c: 471.
<i>cristatus</i> (<i>Hermogenes</i>)	1896c: 457.	<i>tuberculata</i> (<i>Sthenobaea</i>)	1896c: 462.
<i>episcopalpis</i> (<i>Ischnopoda</i>)	1896c: 466.	<i>virgatus</i> (<i>Lonchodes</i>)	1896c: 452.
<i>everetti</i> (<i>Phasgania</i>)	1896c: 461, pl. 40.2.	<i>walkeri</i> (<i>Vasilissa</i>)	1896c: 469.
<i>granulatus</i> (<i>Bathycharax</i>)	1896a: 259, pl. 12.9.	<i>whiteheadi</i> (<i>Lonchodes</i>)	1896c: 451.
<i>hosei</i> (<i>Hermogenes</i>)	1896c: 457, pl. 40.1.	<i>woodfordi</i> (<i>Chondrostethus</i>)	1896c: 455, pl. 39.1 & 39.2.
<i>insularis</i> (<i>Dixippus</i>)	1896c: 460.		

1902

aculiferum (*Bactrododema*) 1902b: 47, pl. 2.1-2.2.
carinatus (*Hyrtacus*) 1902b: 46, pl. 2.3-2.4.

lugardi (*Bactrododema*) 1902a: 448.
wayi (*Bactrododema*) 1902a: 449.

1904

appendiculata (*Ignacia*) 1904b: 446.
bicolor (*Promachus* ?) 1904a: 377.
brasiliensis (*Tersomia*) 1904b: 431.
brunneri (*Necroscia*) 1904c: 376.
cambridgei (*Pseudophasma*) 1904b: 448.
gracillimus (*Staelonchodes*) 1904a: 373.
haanii (*Necroscia*) 1904c: 376.
horsfieldii (*Necroscia*) 1904c: 376.
inca (*Pseudophasma*) 1904b: 447.
iridescens (*Olcyphides*) 1904b: 445.
janus (*Prexaspes*) 1904c: 415.
laetus (*Promachus*) 1904a: 375.
lamellatus (*Oxyartes*) 1904a: 374.
maculata (*Calvisia*) 1904b: 435.
magnifica (*Eurycnema*) 1904b: 439.
malaccensis (*Agondasoidea*) 1904c: 373.

paradoxa (*Acanthoclonia* ?) 1904b: 444.
peninsularis (*Sosibia*) 1904b: 434.
portentosa (*Eurycantha*) 1904b: 442.
pulcherrima (*Orthonecroscia*) 1904b: 436.
ridleyi (*Bactricia*) 1904b: 429.
ridleyi (*Presbistus*) 1904c: 419.
ruficeps (*Orthonecroscia*) 1904b: 437.
saussurei (*Haaniella*) 1904c: 397.
sifia (*Eurycantha*) 1904b: 443.
spuria (*Eubulides*) 1904b: 441.
tonquinensis (*Necroscia*) 1904b: 437.
viridis (*Lonchodes* ?) 1904a: 373.
viridissima (*Eurycnema*) 1904b: 440.
westwoodi (*Necroscia*) 1904c: 376.
willei (*Eurycantha*) 1904b: 442.

1905

alldridgei (*Palophus*) 1905: 279.



Figure 3.
Bathycharax granulatus Kirby,
 1896b, plate 12, figure 9.

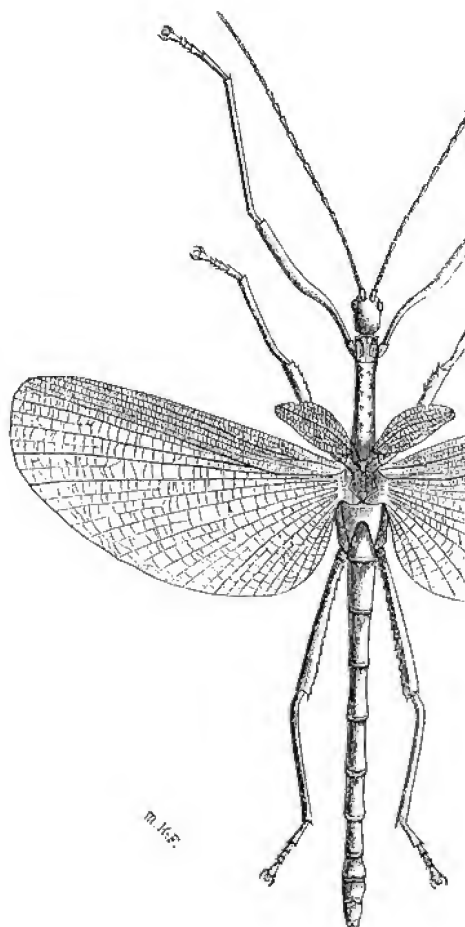


Figure 4.
Necroscia moderata Kirby, 1884, page 478.

Acknowledgements

I am grateful to Berit Pederson (RESL librarian) for finding photographs of Kirby, and for checking details of some publications.

References

- Bragg, P.E. (1996)** Redescriptions, synonyms, and distribution of two species of Lonchodinae from Borneo: *Lonchodes catori* Kirby and *Lonchodes hosei* (Kirby). *Phasmid Studies*, **5**(1): 32-45.
- ICZN - International Commission on Zoological Nomenclature (1999)** *International Code of Zoological Nomenclature, Fourth Edition*. International Trust for Zoological Nomenclature, London.
- Kirby, W. E. (1912)** Obituary. William Forsell Kirby. *Entomologist's Record*, **24**: 314-317.
- Kirby, W.F. (1884)** On the Orthoptera collected during the recent expedition of H.M.S. 'Challenger'. *Annals and magazine of natural History*, (5)**13**: 476-479.
- Kirby, W.F. (1885)** *Elementary Text-book of Entomology*. W. Swan Sonnenschein and Co. Paternoster Square. London. 413 pages [with phasmids on plates 21 & 22].
- Kirby, W.F. (1888)** On the insects (exclusive of Coleoptera and Lepidoptera) of Christmas Island. *Proceedings of the Zoological Society of London*, 1888: 546-555.
- Kirby, W.F. (1889a)** Descriptions of new species of Phasmidae from Dominica, Santa Lucia and Brazil (Theresopolis), in the collection of the British Museum. *Annals and magazine of natural History*, (6)**3**: 501-504.
- Kirby, W.F. (1889b)** Notes on the species of Phasmidae collected by Basil Thomson, Esq., in the Louisiade Archipelago. *Annals and magazine of natural History*, (6)**4**: 229-231.
- Kirby, W.F. (1890)** On the employment of the names of proposed for genera of Orthoptera, previous to 1840. *Scientific Proceedings of the Royal Dublin Society*, **6**: 556-597.
- Kirby, W.F. (1891)** On the Phasmidae of Madagascar, with the description of a new genus and species in the collection of the British Museum. *Annals and magazine of natural History*, (6)**8**: 150-152.
- Kirby, W.F. (1895)** On the insects other than Coleoptera obtained by Dr. Anderson's collector during Mr. T. Bent's expedition to the Hadramaut, South Arabia. *Journal of the Linnean Society (Zoology)*, London, **25**: 279-281.
- Kirby, W.F. (1896a)** A list of the Orthoptera, Hymenoptera, and Hemiptera collected by Miss Kingsley on the river Ogové, with descriptions of some new genera and species. *Annals and magazine of natural History*, (6)**18**: 257-269, pl.12.
- Kirby, W.F. (1896b)** Description of a new species of stick-insect from British Central Africa. *Annals and magazine of natural History*, (6)**18**: 463-464.
- Kirby, W.F. (1896c)** On some new or rare Phasmidae in the collection of the British Museum. *Transactions of the Linnean Society of London*, (2)**6**: 447-475, pl. 39 & 40.
- Kirby, W.F. (1900)** Order 9. Orthoptera. in **Andrews, C.W. et. al. (1900)** *A Monograph of Christmas Island (Indian Ocean): Physical Features and Geology* by C.W. Andrews, B.A., B.Sc., F.G.S., with descriptions of the Fauna and Flora by numerous contributors. British Museum, London.
- Kirby, W.F. (1902a)** Descriptions of two new species of *Bactrododema* (Phasmidae) in the collection of the British Museum (Natural History). *Annals and magazine of natural History*, (7)**9**: 448-449.
- Kirby, W.F. (1902b)** Phasmidae. in **Distant, W.L.:** *Insecta Transvaaliensia. A contribution to the knowledge of the Entomology of South Africa*. Part 1. Orthoptera. pages 42-48, pl. 2. H L Distant, London.
- Kirby, W.F. (1904a)** Notes on Phasmidae in the collection of the British Museum (Natural History), South Kensington, with descriptions of new species. – No. I. *Annals and magazine of natural History*, (7)**13**: 372-377.
- Kirby, W.F. (1904b)** Notes on Phasmidae in the collection of the British Museum (Natural History), South Kensington, with descriptions of new genera and species – No. II. *Annals and magazine of natural History*, (7)**13**: 429-449.
- Kirby, W.F. (1904c)** *A synonymic Catalogue of Orthoptera, volume 1*. British Museum, London.
- Kirby, W.F. (1905)** Description of a new species of *Palophus* (Phasmidae) from West Africa. *Annales and magazine of natural History*, (7)**15**: 279-281.
- Kirby, W.F. (1910)** *A synonymic catalogue of Orthoptera, volume 3*. British Museum, London.

Kirby (1885) *Elementary Text-book of Entomology* is available online at:

<http://www.scientiadigital.com/zoologia/KirbyZoo/pag1.shtml> (With phasmids on plates 21 & 22)

Erratum [Issued in *Phasmid Studies* 16(2): 56] — The following reference was omitted:

Kirby, W.F. (1910) An undetermined species of stick-insect found in Devonshire. *Zoologist*, (4)**14**: 197-198.
This paper is the first record of a phasmid living in Britain.

A description of the male and egg of *Sipyloidea acutipennis* (Bates, 1865) (Diapheromeridae: Necrosiinae).

P.E. Bragg, 8 The Lane, Awwsworth, Nottinghamshire, NG16 2QP, U.K.

Abstract

Sipyloidea acutipennis (Bates, 1865) was described from a single female from Ceylon (Sri Lanka). It is here recorded from three localities in India, and the male and egg are described and illustrated for the first time.

Key words

Phasmida, India, *Sipyloidea acutipennis* (Bates, 1865), description of male, description of egg

Introduction

Manchester Museum (MMUE) had a large number of phasmids in paper packets that had been collected in the 1950s. I examined and set a few of the smaller specimens in the 1990s but remainder stayed in their packets until they were set by Dr Yvonne Goulding in early 2006. I identified some of these specimens in 2006 as *Sipyloidea acutipennis* (Bates, 1865). A pair of specimens were taken to Oxford Museum (OXUM) and compared with the female holotype.

Necrosia acutipennis Bates, 1865 was described from a single female specimen from Ceylon (now known as Sri Lanka) and had not been recorded from elsewhere until I (Bragg, 2007) briefly mentioned material from Southern India. The male and egg of this species have not been described. Below I give the data for the Indian specimens and describe the male and egg of this species.

When Bates described the species he said “The wings are produced and acute at the apex.” and gave it the specific name, *acutipennis* – meaning “pointed wings”. However, this is misleading because, contrary to the description, wings are not pointed. The wings of the holotype are not fully spread, which gives a pointed appearance to the tip of the wing; when the wings of this species are fully opened they have a normal appearance.

The material recorded here is from the two southernmost states of India: Tamil Nadu and Kerala. The approximate latitude and longitude of these sites are given in table 1 and localities are plotted on the distribution map in red (figure 1).



Figure 1.

Table 1. Distribution of <i>Sipyloidea acutipennis</i> within India.		
State	Locality	Latitude & longitude
Kerala	Ponmudi Range	N08° 30' E77° 00'
Tamil Nadu	Cinchona, Anamalai Hills	N10° 20' E77° 00'
Tamil Nadu	Devla, Nilgiri Hills	N11° 30' E76° 30'

The generic position of this species is uncertain. Redtenbacher (1908: 550) placed the species in the genus *Sipyloidea* Brunner, 1893. However, cultured specimens of the type species, *Sipyloidea sipylus* (Westwood, 1859), glue their eggs to a substrate, this is not the case for many of the other 57 species that Redtenbacher placed in the genus. Eggs removed

from the body of *Sipyloidea acutipennis* do not seem to have a flattened ventral surface, which would be expected of eggs which are glued to a substrate, but they are not in perfect condition so this mode of laying cannot be ruled out.

***Sipyloidea acutipennis* Bates, 1865**

Necroscia acutipennis Bates, 1865: 354, pl. 45.5; Kirby, 1904: 375; Bragg, 2007: 4. Holotype ♀ (OXUM) Ceylon. coll. Nietner.

Sipyloidea acutipennis (Bates); Redtenbacher, 1908: 550; Otte & Brock, 2005: 316.

Material

South India, Kerala State, Trivandrum Dt., Ponmudi Range, 3,000ft, v.1972, TRS Nathan.

♂ (MMUE F3224.60)

South India, Anamalai Hills, 3500ft, iv.1965, P.S. Nathan.

♂ (MMUE F3224.82), ♀ (MMUE F3224.88), ♀ (MMUE F3224.279)

South India, Anamalai Hills, Cinchona, 3500ft., v. 1960, P.S. Nathan.

♀ (MMUE F3224.368), ♀ (MMUE F3224.280), ♂ (MMUE F3224.278).

South India, Nilgiri Hills, Devala, 3200ft., x. 1960, P.S. Nathan.

♂ (MMUE F3224.358), ♀ (MMUE F3224.359), ♀ (MMUE F3224.360)

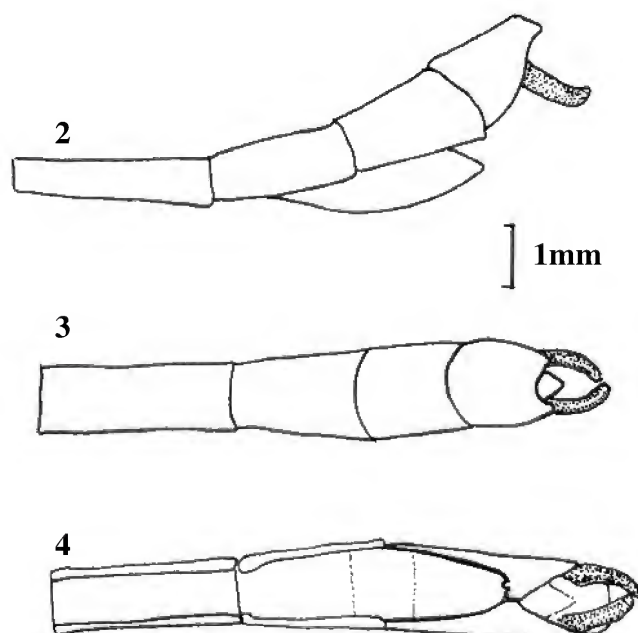
Descriptions and measurements

The following descriptions are based only on specimens F3224.280 and F3224.278.

Male (figs 2-4 & 6)

Head and body green with two longitudinal stripes on each side: one black, one white; the part of the abdomen that is covered by the wings is brownish. Legs green. Eyes brown. Viewed laterally, the male is green with a black and a white stripe running most of the length of the insect.

There is a white stripe running from the back of each eye to the back of the head. The lateral margins of the mesonotum have a thin black line and there is a broader white stripe above this. The pronotum has some black on the lateral margins as do abdominal segments 7-9. Forewings green with a central longitudinal white stripe, the anterior half of the stripe has a narrow black stripe on each side. The costal region of the hindwing has a green leading edge, followed by a black stripe, white stripe, green stripe and then a brown stripe. Anal region clear or slightly pinkish, with greenish veins. Measurements are given in table 2.



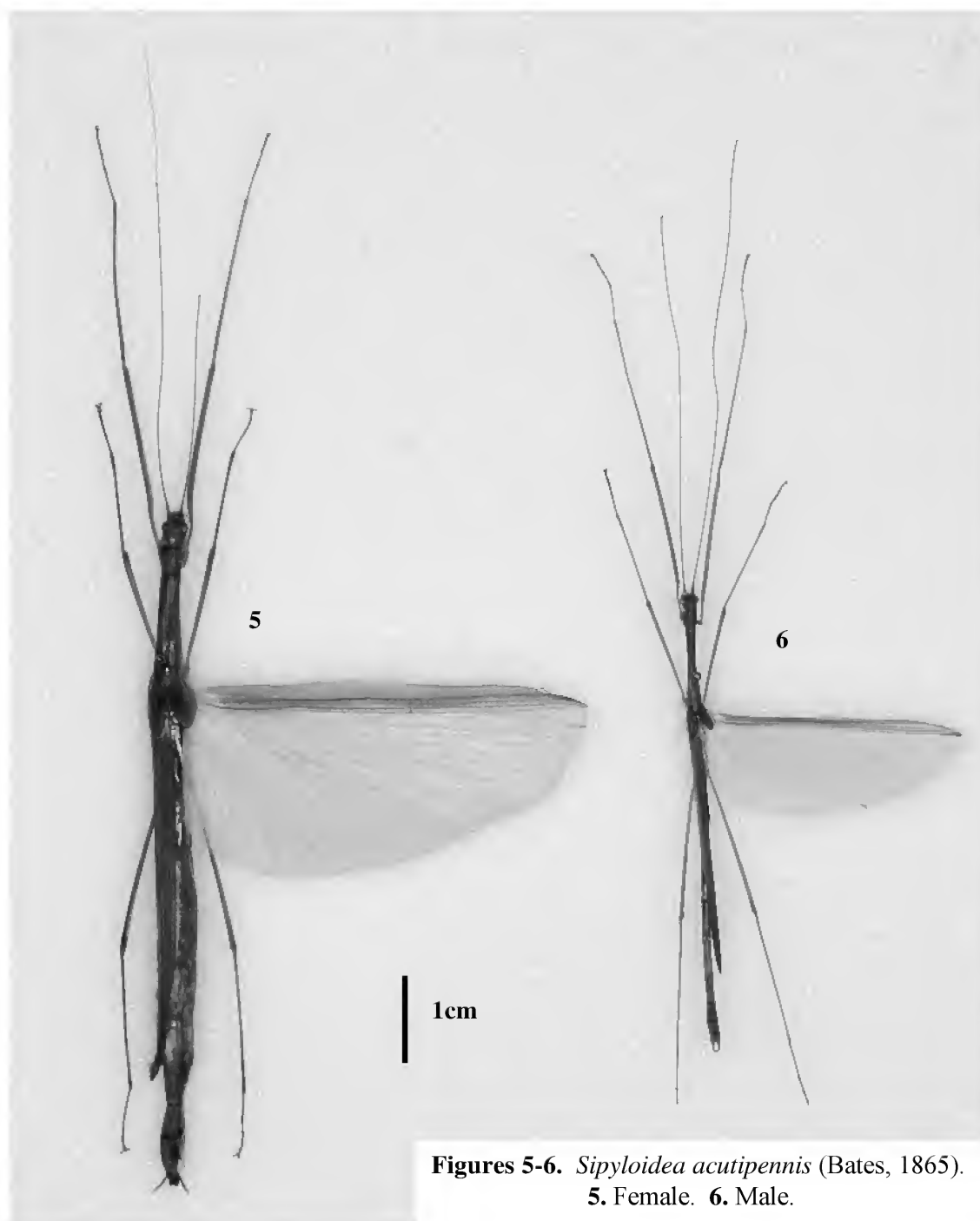
Figures 2-4. Abdomen of male.

2. Lateral view.

3. Dorsal view.

4. Ventral view.

Head and body smooth, without any granules or tubercles; mesothorax with a very fine median longitudinal carina. Head and body extremely sparingly setose except abdominal sternites 7-9 which are moderately setose, and metanotum and abdominal terga 1-6 which lack setae. Antennae slender, clearly longer than the fore legs. Width of head (excluding eyes) about $\frac{5}{6}$ of the length; eyes protruding laterally. Pronotum about 1.6 times longer than wide. Mesonotum slightly narrowing behind anterior margin, then widening evenly, posterior margin about 1.4 times width of anterior margin; length about five times width of posterior margin. Metanotum and abdominal segments 1-6 of about equal length (3-5 only very slightly longer), segment 7 is two-thirds as long as 6th, segments 8-9 half as long as 6th, segment 10 about one third as long as 6th. Tenth abdominal tergite with a notch, 11th forming a triangular protrusion. Poculum fairly shallow, with a minute apical notch. Cerci prominent, almost cylindrical, slightly tapering and strongly incurving near the apices.



Figures 5-6. *Sipyloidea acutipennis* (Bates, 1865).
5. Female. 6. Male.

Legs without spines (although some ventro-lateral carinae of the femora terminate as minute points); carinae densely setose, particularly on ventral carinae, setae reduced in number and size on dorsal surface of hind femora. Fore tibia and fore femur of almost equal length, mid and hind tibiae slightly shorter than corresponding femora. Each leg with tarsus about half as long as femur. Fore legs with basal tarsomere about as long as combined length of tarsomeres 2-5; mid and hind legs with basal tarsomere clearly shorter than combined length of 2-5. Forewings reaching end of metanotum, with a small conical hump. Wings reaching to apex of 6th abdominal segment.

Female (fig 6)

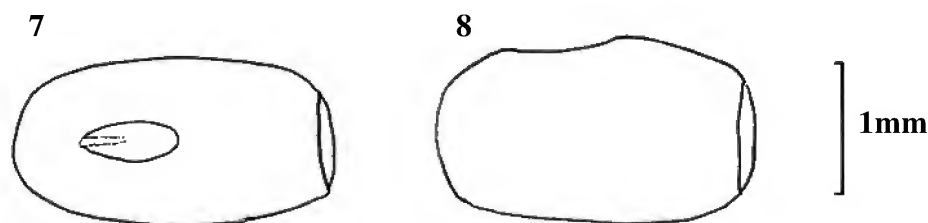
Coloration generally similar to male but the stripes on the body are indistinct, and almost absent on the mesothorax. Forewings green with a central longitudinal white stripe, the anterior half of the stripe has a narrow black stripe on each side. Hind wings with subcostal and costal areas green, cubital and plical areas brown; anal region clear or slightly pinkish, with greenish veins. Measurements are given in table 2.

Head and pronotum as in male. Mesonotum widening slightly and evenly; length about four times the width of the posterior margin. Metanotum and abdominal segments 1-6 of roughly similar lengths; segments 7 & 8 each about two thirds as long as 5th; segments 9 & 10 each about half as long as 7th. Lamina supraanalis triangular. Operculum tapering to a point, reaching almost to apex of 10th tergite. Cerci long, slender, straight, narrowing evenly to a point. Legs similar to male except all tibiae are slightly shorter than the corresponding femur. Wings reaching slightly beyond apex of 6th segment.

Table 2. <i>Sipylodea acutipennis</i> (Bates, 1865). Measurements in mm.					
	♂	♀		♂	♀
Body length	51	75	Fore femur	16.1	20.1
Antennae	51	53+	Fore tibia	16.3	18.7
Head	2.3	3.9	Fore tarsus	8.1	9.0
Pronotum	2.4	3.5	Mid femur	11.6	13.1
Mesonotum	8.6	11.7	Mid tibia	10.5	10.6
Metanotum	3.1	5.3	Mid tarsus	5.5	6.1
Median segment	4.4	6.5	Hind femur	15.7	17.9
Fore wing	3.7	7.1	Hind tibia	14.8	15.8
Hind wing	29	45	Hind tarsus	7.7	7.5

Egg (figs 7-8)

Three eggs were removed from the body of specimen F3224.280. The eggs were full sized but the surface detail appears to be poorly developed and lacking any pigmentation. Capsule cylindrical, length 2.3mm, width 1.2mm, height 1.3mm. Micropylar plate oval and positioned slightly towards the polar end. Operculum slightly convex; oval, slightly higher than wide (0.85mm x 0.72mm).



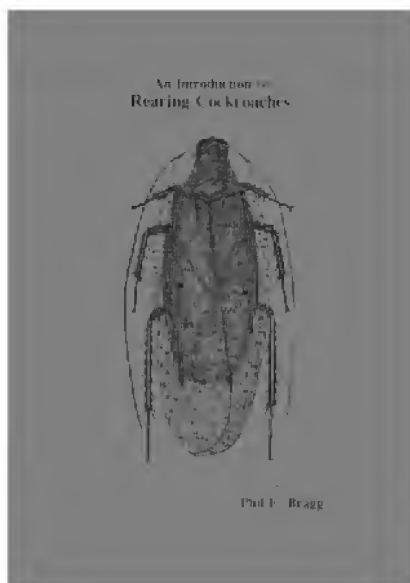
Figures 7-8. Egg of *Sipyloidea acutipennis* (Bates, 1865)
7. Dorsal view. 8. Lateral view.

Acknowledgements

Thanks to Dr Dmitri Logunov (MMUE) for the loan of specimens and to Dr Yvonne Goulding for checking the data.

References

- Bragg, P.E.** (2007) Biographies of Phasmatologists – 1. Henry Walter Bates. *Phasmid Studies*, **15**(1&2): 1-4.
- Bates, H.W.** (1865) Descriptions of fifty-two new species of Phasmidae from the collection of Mr. W. Wilson Saunders, with remarks on the family. *Transactions of the Linnaean Society of London*, **25**(1) 321-359 & plates 44-45.
- Kirby, W.F.** (1904) *A synonymic Catalogue of Orthoptera*. Vol. 1. British Museum, London.
- Otte, D. & Brock, P.** (2005) *Phasmida Species File, Catalog of Stick and Leaf Insects of the World*. Insect Diversity Association, Philadelphia.
- Redtenbacher, J.** (1908) *Die Insektenfamilie der Phasmiden*. Vol. 3. Wilhelm Engelmann, Leipzig.



An Introduction to Rearing Cockroaches

ISBN 0-9531195-1-3. Published 1997.

A5, softback, 16 pages, 14 figs.

This book is intended as a beginners' guide to rearing cockroaches. It is illustrated with 14 black and white drawings. The drawings illustrate eight different species and show how to distinguish the sexes.

There is a general introduction to cockroaches with information on the structure and different types. The commonly available species are grouped according to their general type and their suitability for culturing. Cages, feeding and preserving are all discussed. There are suggestions on obtaining and distributing cockroaches, and there is a list of books offering further information.

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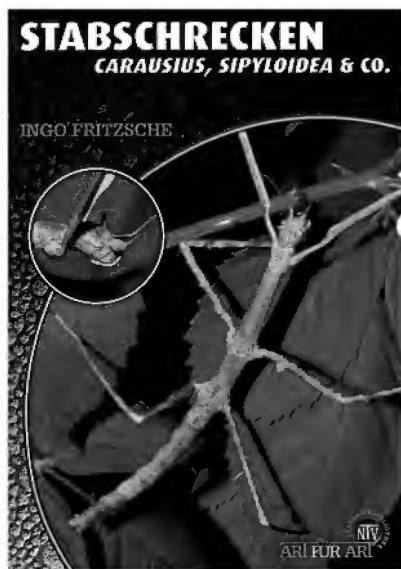
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Reviews and Abstracts.

Book Review



Stabschrecken – Carausius, Sipyloidea & Co. by Ingo Fritzsche. Softback, 21cm x 15 cm, 64 pages, 43 colour photographs and 2 line drawings. Published by Natur und Tier – Verlag GmbH, Münster. Price €9.80. ISBN 978-3-937285-84-9.

Reviewed by P.E. Bragg.

A very good quality beginners' guide to rearing phasmids with some excellent photographs. The German text follows the usual format used in beginners' guides: general introduction, basic anatomy, egg structure, cages, general care, foodplants, and then a more detailed account of a few species. The section on where to obtain phasmids is followed by slightly more unusual sections on transporting phasmids and quarantine. The book is well illustrated, with almost one colour photograph on each page except in the species detail section. The photographs are an interesting selection, including a variety of cages, egg containers, a mixture of eggs and droppings, and an unusual

shot of a phasmid gluing its eggs to a plant stem; even the posed pictures of phasmids standing on leaves have a variety of backgrounds.

The final section of the book covers eleven species in detail. For each species the PSG number is given in addition to the genus, species, author and date. It is nice to see that the choice of species in this section is not the same as in most books of this type. The author has managed to select species that are suitable for beginners and yet has included several with a very personal link. Several of these eleven species were collected by the author, one was described by the author, and one is named after the author. Some of the photographs in this section are rather small but this is a minor drawback as all are featured in larger illustrations elsewhere in the book.

There are many beginners' guides on the market in various languages. This one stands out because of the high quality of the production, good lay out, and the wide variety of photographic styles used. A "must buy" for any German readers with an interest in phasmids.

Phasmid Abstracts

The following abstracts briefly summarise articles that have recently appeared in other publications. Some of these may be available from local libraries. Others will be available in university or college libraries, many of these libraries allow non-members to use their facilities for reference purposes free of charge.

The editor of *Phasmid Studies* would welcome recent abstracts from authors so that they may be included in forthcoming issues. In the case of publications specialising in phasmids, such as *Phasma*, only the longer papers are summarised.

Bradler, S., Whiting, M.F. & Klug, R. (2003) Basal diversification and the evolution of wings within stick insects (Phasmatodea). Proceedings of 1st Dresden meeting on insect phylogeny. *Entomologische Abhandlungen*, **61**(2): 132-133.

Alternative hypotheses for the splitting of Phasmatodea are discussed.

Bragg, P.E. (2007) Biografie van een Phasmatoloog: Hermann Bürmeister. *Phasma*, **17**(64): 18-20. [In Dutch].

Karl Hermann Konrad Burmeister was a German zoologist and entomologist. His life and phasmid work are outlined. Although he published over 75 entomological papers, only *Handbuch de Entomology* (1838) included any work on phasmids. Burmeister's phasmid work was limited but important in historical terms. He described one new genus, renamed a second, and described 32 new species: a significant number at that time.

Brasseel J. (2007) Species report No. 6: PSG 277 *Phobaeticus heusii* (Hennemann & Conle, 1997) psg 277, een mooie grote wandelende tak uit Vietnam. *Phasma*, **17**(64): 8-9 (& 12). [In Dutch].

A report on rearing PSG 277, *Phobaeticus heusii* (Hennemann & Conle, 1997), a large phasmid from Vietnam, remarkable for its large males. The author describes the breeding conditions and the origin of the culture. A colour photograph appears on page 12.

Gottardo, M. (2007) First record of the genus *Dinophasma* Uvarov from the Philippines (Phasmatodea: Aschiphasmataidae).

Dinophasma maalon n.sp. is described from a single male from Panay Island in the Philippines. The species is similar to *Dinophasma braggi* (Zompro, 1994).

Jansen, E. (2007) De meelmot, een prachtig insect met grote gevolgen. *Phasma*, **17**(64): 16-17 (& 12). [In Dutch].

The Meal Moth (*Pyralis farinalis* Linnaeus, 1758) is a worldwide agricultural pest species. The larvae are white with black heads and feed on stored cereals such as oats and flour. The larvae make silk, which they spin to form tubes in which they live. This pest species can also have an adverse effect on phasmids. If the moth larvae lay down tubes near phasmid eggs, the eggs can become encased by the silken threads, preventing the phasmid nymphs from emerging. A colour photograph appears on page 12.

Jansen, E. (2007) De verschillen tussen *Eurycantha calarata* (Lucas, 1872) en *Eurycantha calcarata* sp. (Lucas, 1869). *Phasma*, **17**(65): 7-10. [In Dutch].

The article compares two phasmid cultures PSG 23 and PSG 44: the two cultures of *Eurycantha calcarata* Lucas, 1869. The article is based largely on articles that were originally published in PSG Newsletters 8, 9, 10, 30 & 37.

Klug, R. & Bradler, S. (2006) The pregenital abdominal musculature in phasmids and its implications for the basal phylogeny of Phasmatodea (Insecta: Polyneoptera). *Organisms, Diversity & Evolution*, **6**: 171-184.

Recently several conflicting hypotheses concerning the basal phylogenetic relationships within the Phasmatodea (stick and leaf insects) have emerged. In previous studies, musculature of the abdomen proved to be quite informative for identifying basal taxa among Phasmatodea and led to conclusions regarding the basal splitting events within the group. However, this character complex was not studied thoroughly for a representative number of species, and usually muscle innervation was omitted. In the present study the musculature and nerve topography of mid-abdominal segments in both sexes of seven phasmid species are described and compared in detail for the first time including all putative basal taxa, e.g. members of *Timema*, *Agathemera*, Phylliinae, Aschiphasmatinae and Heteropteryginae. The ground pattern of the muscle and nerve arrangement of mid-abdominal segments, i.e. of those not modified due to association with the thorax or

genitalia, is reconstructed. In *Timema*, the inner ventral longitudinal muscles are present, whereas they are lost in all remaining Phasmatodea (Euphasmatodea). The ventral longitudinal muscles in the abdomen of *Agathemera*, which span the whole length of each segment, do not represent the plesiomorphic condition as previously assumed, but might be a result of secondary elongation of the external ventral longitudinal muscles. Sexual dimorphism, common within the Phasmatodea, also applies to the muscle arrangement in the abdomen of some species. Only in the females of *Haaniella dehaanii* (Heteropteryginae) and *Phyllium celebicum* (Phylliinae) the ventral external longitudinal muscles are elongated and span the length of the whole segment, possibly as a result of convergent evolution.

La Brijn, R. (2007) Remus en Romulus = “Duplo”, de tweekoppige *Carausius morosus*. *Phasma*, **17**(64): 13-15. [In Dutch].

In 1963 a two-headed *Carausius morosus* hatched in the Dutch zoo Artis. The discusses the specimen. Two photographs are included, one showing the specimen shedding its skin.

La Brijn, R. (2007) Remus en Romulus = “Duplo”, de tweekoppige *Carausius morosus* (deel 2). *Phasma*, **17**(65): 23-25. [In Dutch].

Part two of an article on a two-headed *Carausius morosus* hatched in the Dutch zoo Artis in 1963.

Rabaey, K. (2007) Species report No. 6. *Carausius morosus* (Sinéty, 1899). *Phasma*, **17**(65): 18. [In Dutch].

A brief report on *Carausius morosus* (Sinéty, 1901).

Rabaey, K. & Simoens, R. (2007) Species report No. 5: *Diapherodes venustula* (Audinet-Serville, 1838) een nieuwe soort in kweek afkomstig uit Cuba. *Phasma*, **17**(64): 6-7 (& 12). [In Dutch].

A report on rearing *Diapherodes venustula* (Audinet-Serville, 1838), a culture collected by Ingo Fritzsche in Cuba during 2005. Two colour photographs appear on page 12.

Rabaey, K. & Simoens, R. (2007) Species report No. 7. PSG 81: *Acanthoxyla inermis* (Salmon, 1955) New Zealand and UK. *Phasma*, **17**(64): 10-11 (& 12). [In Dutch].

Tim Bollens and Stijn Bauwens went to Truro in Cornwall and found *Acanthoxyla inermis* Salmon, 1955 in the wild. This article gives some of the history of the species in the UK. A colour photograph appears on page 12.

Wedmann, S., Bradler, S. & Rust, J. (2007) Het eerste fossiele wandelend blad: 47 miljoen jaar van gespecialiseerd gedrag en camouflage morfologie. *Phasma*, **17**(65): 11-16. [In Dutch].

A Dutch translation, by Rob Simoens and Kristien Rabaey, of the authors' 2006 paper “The first fossil leaf insect: 47 million years of specialised cryptic morphology and behavior”, originally published in *Proceedings of the National Academy of Science*, **104**: 565-569. [See *Phasmid Studies* 15: 31 for abstract].

Zompro, O. (2007) Revision of *Oncotophasma* Rehn (Insecta: Phasmatodea: Diapheromeridae). *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)*, 703: 1-25.

The Central American genus *Oncotophasma* Rehn, 1904 (= *Paradiapheromera* Brunner von Wattenwyl, 1907) (Phasmatodea: Diapheromeridae: Diapheromerinae: Diapheromerini) is revised. The genus contains eight species, of which three are described for the first time: *Oncotophasma limonese* n.sp., *O. maculosum* n.sp. and *O. weitschati* n.sp. Listings of museum material and keys to species are included.

Biographies of Phasmatologists – 5. Carl Linnaeus.

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Abstract

Carl Linnaeus is best known for his system of grouping and naming plants and animals that, in a modified form, is still in use today. Although he did little work on phasmids, his work is significant because he created the first scientific names of phasmids. His life and phasmid work is outlined.

Keywords

Phasmida, Phasmatologist, Carolus Linnaeus, Carl von Linné, Carl Linnaeus, Biography.

Introduction

Linnaeus was not really a phasmatologist, he described 4 species, and did not recognise them as a distinct group – they were not distinguished from the praying mantids. However, he is viewed as the founder of the system of biological nomenclature – the international system for naming animals and plants. Linnaeus was the first person to describe any phasmids under this system; this means that it could be argued that in 1758 he was the only phasmatologist in the world! Since 2007 is the 300th anniversary of his birth it seemed appropriate to include him in the series *Biographies of Phasmatologists*.

As the founder of our system for naming organisms, it is somewhat ironic that there is often confusion over his name. When he was born, in Sweden, surnames were not in common use, so he was just known as Carl. When he needed a surname at university he adopted the surname Linnaeus; he chose a Latin name because this was the international language of Science at that time. He subsequently Latinised his forename from Carl to Carolus for publishing his work. In later life he was granted nobility and became known as Carl von Linné.

Carl Linnaeus (1707-1778)

Carl was born on May 23rd 1707, at Stenbrohult, in the province of Småland in southern Sweden. His father, Nils Ingemarsson, was both an avid gardener and a Lutheran pastor, and Carl showed a deep love of plants and a fascination with their names from a very early age. Carl showed no desire to follow in his father's footsteps by training for the priesthood, but his family was somewhat consoled when Linnaeus entered the University of Lund in 1727 to study medicine. A year later, he transferred to the prestigious University of Uppsala. However, its medical facilities had been neglected and most of Linnaeus's time at Uppsala was spent collecting and studying plants, his true love. At the time, training in botany was part of the medical curriculum, for every doctor had to prepare and prescribe drugs derived from medicinal plants.

Despite financial difficulties, Linnaeus mounted a botanical and ethnographical expedition to Lapland in 1731, followed by one to central Sweden in 1734.

In 1735 Linnaeus went to the Netherlands to finish his medical degree at the University of Harderwijk; he then enrolled in the University of Leiden for further studies. In the same year he published the first edition of his classification of living things, the *Systema Naturae*. He met or corresponded with many of Europe's leading botanists, and continued to develop



his classification scheme. Linnaeus continually revised his *Systema Naturae*, which grew from a slim pamphlet to a multivolume work, as his concepts were modified and as more and more plant and animal specimens were sent to him from every corner of the globe.

Returning to Sweden in 1738, he practiced medicine (specializing in the treatment of syphilis) and lectured in Stockholm. In September 1739 he married Sara Elisabeth Morea. They had seven children, Carl, Elisabeth, Sara Magdalena, Lovisa, Sara Christina, Johannes, Sophie; only five survived to adult. In 1741 he was awarded a professorship at Uppsala University. At Uppsala he restored the University's botanical garden, arranging the plants according to his system of classification. He made three more expeditions to various parts of Sweden and appears to have inspired many of his students. Linnaeus arranged for a number of his students to take part in exploration voyages to all parts of the world. Perhaps his most famous student, Daniel Solander, was the naturalist on Captain James Cook's first round-the-world voyage and brought back the first plant collections from Australia and the South Pacific. Another of his students, Carl Peter Thunberg, described eleven phasmids after the death of Linnaeus, one in 1784 and ten in 1815.

Uppsala Astronomical Observatory was founded by Anders Celsius in the same year that Linnaeus became a professor. The year after Celsius died, Linnaeus reversed the numbering of the temperature scale that Celsius had invented, giving us the scale that we use today (The original Celsius scale had water boiling at 0° and freezing at 100°).

Linnaeus was keen to make the Swedish economy more self-sufficient and less dependent on foreign trade, either by acclimatising crops to grow in Sweden, or by finding native substitutes. Sadly, Sweden's cold climate made his attempts to grow cacao, coffee, tea, bananas, rice, and mulberries unsuccessful. His attempts to find native Swedish plants that could be used as tea, coffee, flour, and animal fodder were also not very successful.

Linnaeus continued to practice medicine and eventually became personal physician to the Swedish royal family. In 1758 he bought the manor estate of Hammarby, outside Uppsala, where he built a small museum for his extensive personal collections. In 1761 he was granted nobility, and became Carl von Linné. In 1774 he suffered what was probably a series of mild strokes and remained in poor health until he died on January 10th 1778.

His only surviving son, also called Carl, succeeded his father as a professor at Uppsala University and inherited his personal collections. When he died five years later his father's library, manuscripts, and natural history collections were sold to the English natural historian Sir James Edward Smith. Much of the material that Linnaeus used in his work belonged to the University and this material is still housed in the Uppsala University Museum.

The Linnaeus legacy

The first edition of *Systema Naturae* was printed in the Netherlands in 1735; it was eleven pages long. Linnaeus continued to expand this work and produced several editions over the years; figure 2 (opposite) shows the title page of volume one of the 10th edition in 1758. Linnaeus did not invent the classification system, or binomial nomenclature on his own. However, he developed existing systems and was the first person to use them consistently throughout what became a comprehensive publication. His work became the standard for taxonomy (grouping organisms) and nomenclature (naming species).

Present day taxonomy is still based on his ideas, although, because ideas of how animals should be grouped change as new evidence is found, the Linnaeus system has had to undergo huge changes. To put things in context, there are now more families known than there were species in Linnaeus' time. The system has many more hierarchical levels than Linnaeus used, but the basic principles are the same.

Present day nomenclature has changed very little from Linnaeus' system. It is based on a binomial system: each species is given a generic name and specific name which have to

follow the rules of Latin grammar; the combination of these names is unique to that particular type of animal. The explosion of new species being discovered in the 19th Century resulted in confusion as new names created by different people in different countries. It soon became clear that some form of regulation was essential to deal with problems such as different people giving the same name to different animals. As early as the 1840s a fairly widely accepted code was produced; this was developed over the next 60 years. The 5th International Congress of Zoology set up the International Commission for Zoological Nomenclature (ICZN) to oversee the rules. The ICZN adopted the 10th edition of *Systema Naturae* as the starting point for scientific names.

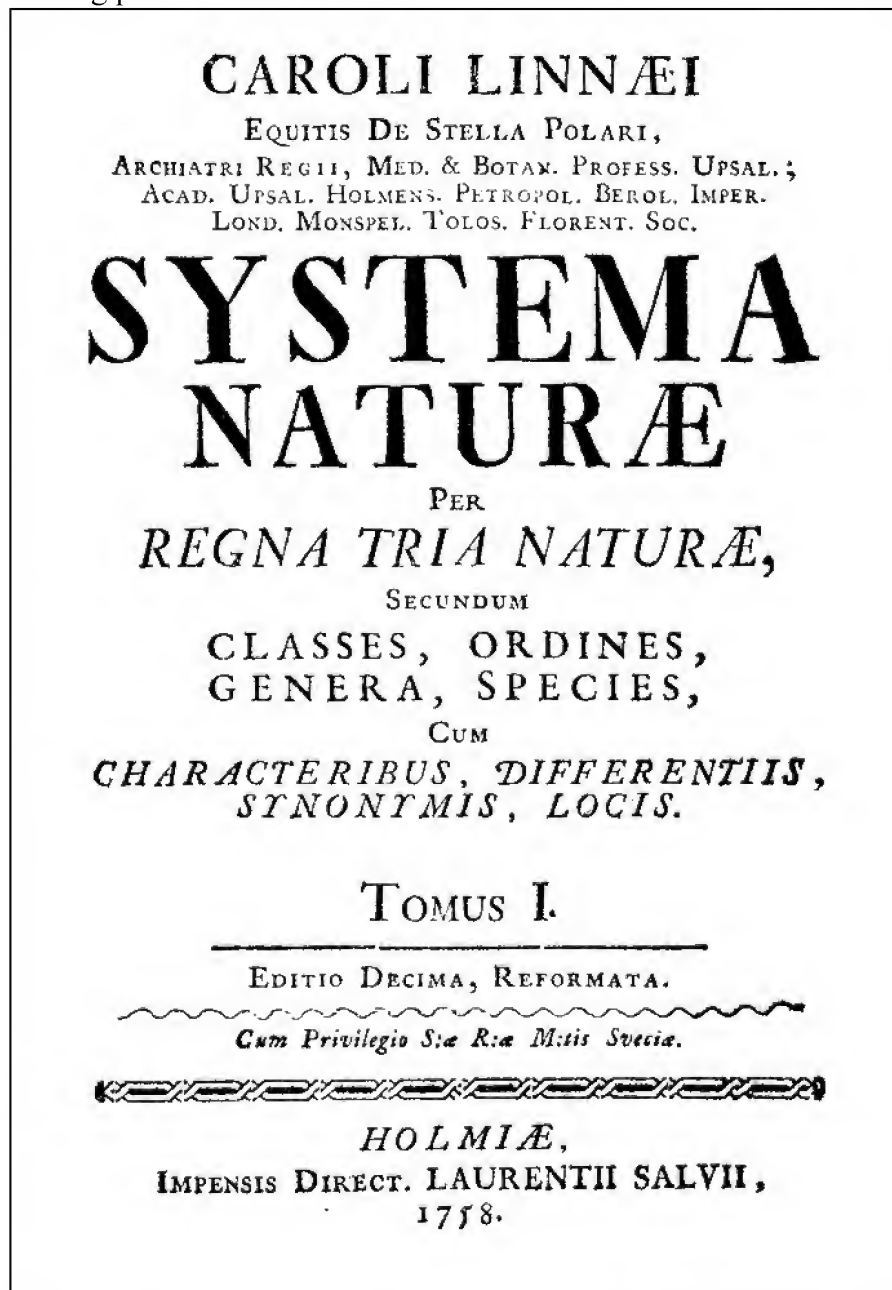
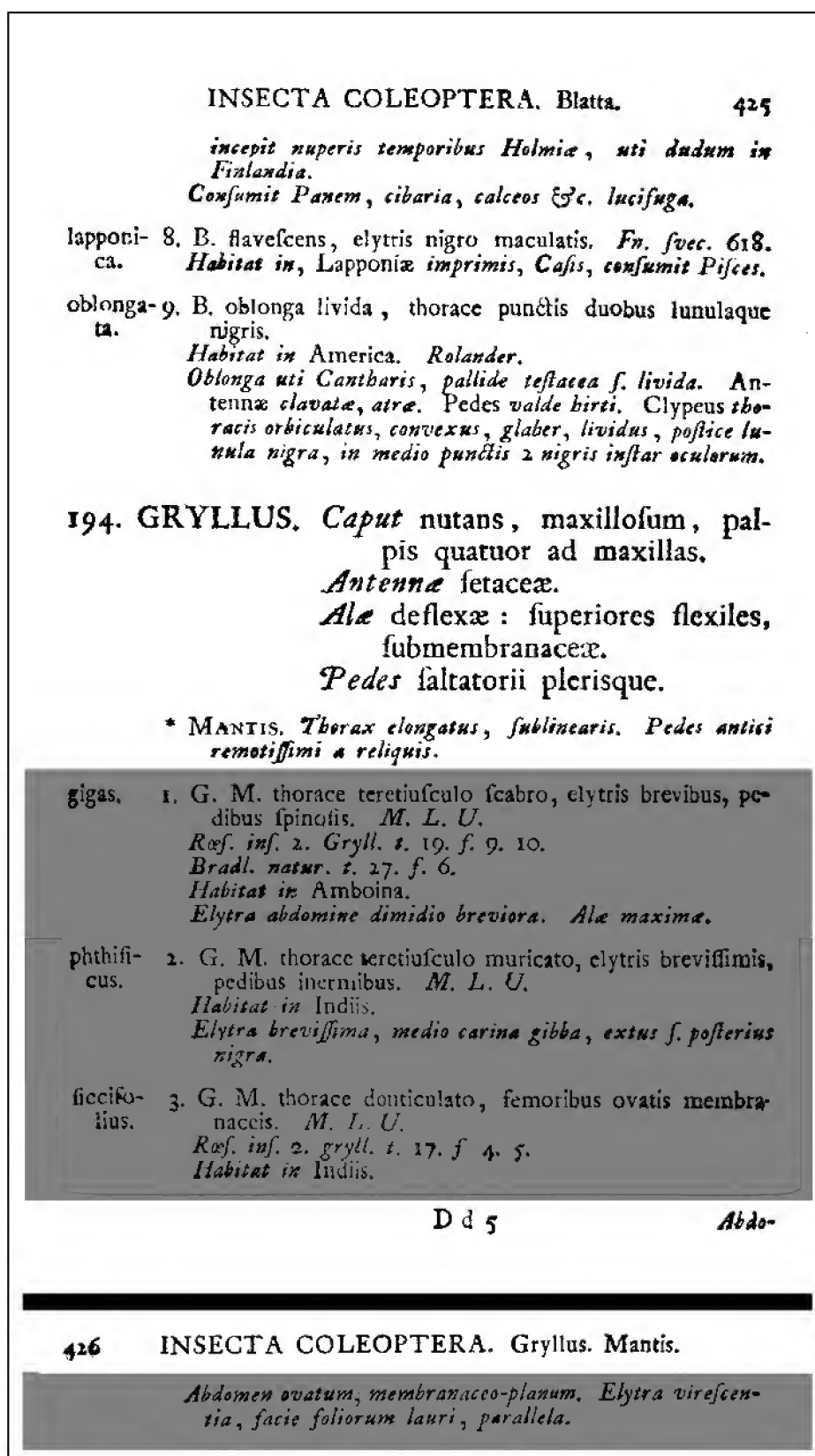


Figure 2.
Title page of
volume 1 of the
10th Edition.

The 10th edition of *Systema Naturae*, published by Linnaeus 1758, classified and described 4,400 species of animals and 7,700 species of plants. Volume 1 of the 1758 edition deals with the animals; classification of plants is based on a different edition and is overseen by a separate organisation. Since 1758, the number of known species of animals has risen from 4,400 to about one million; the number of stick insect names has risen from three to over 3,000.

Systema Naturae was written in Latin, the usual language for scientific work at that time. Figure 3 (below) shows page 425 and the top few lines of page 226; I have highlighted the three phasmids in different colours.

Figure 3.
Page 425 & top
of page 426 of
the 10th edition
of *Systema
Naturae*, with
phasmids
highlighted in
colour.



The Linnean Society and the Linnaean collection

James Smith was one of the founders, and the first President, of the Linnean Society of London in 1788. The society was set up to further the knowledge of natural history, and is now the oldest extant biological society in the world. Other Linnean Societies, with similar aims, were later formed in other countries throughout the world. The Linnean Society of London bought Smith's collection (including Linnaeus' material) after his death in 1828. The Linnaean manuscripts and collections are preserved at the Linnean Society, Burlington House, in London.

Smith's own collection was mixed in with those he bought from the Linnaeus family so it is not always clear which specimens belonged to Linnaeus. The collection includes about 14,000 plant and 5,000 animal specimens that are believed to have come from Linnaeus; of these 3,198 are insects (Fitton & Harman, 2007), and two are phasmids (Marshall, 1983).

Specimens in Uppsala University Museum

Brock (2002) gave details and photographs of the specimens described by Linnaeus that are in the museum at Uppsala. There are a total of four specimens, three of *Phasma gigas* (Linnaeus, 1758) and one of *Phyllium siccifolium* (Linnaeus, 1758).

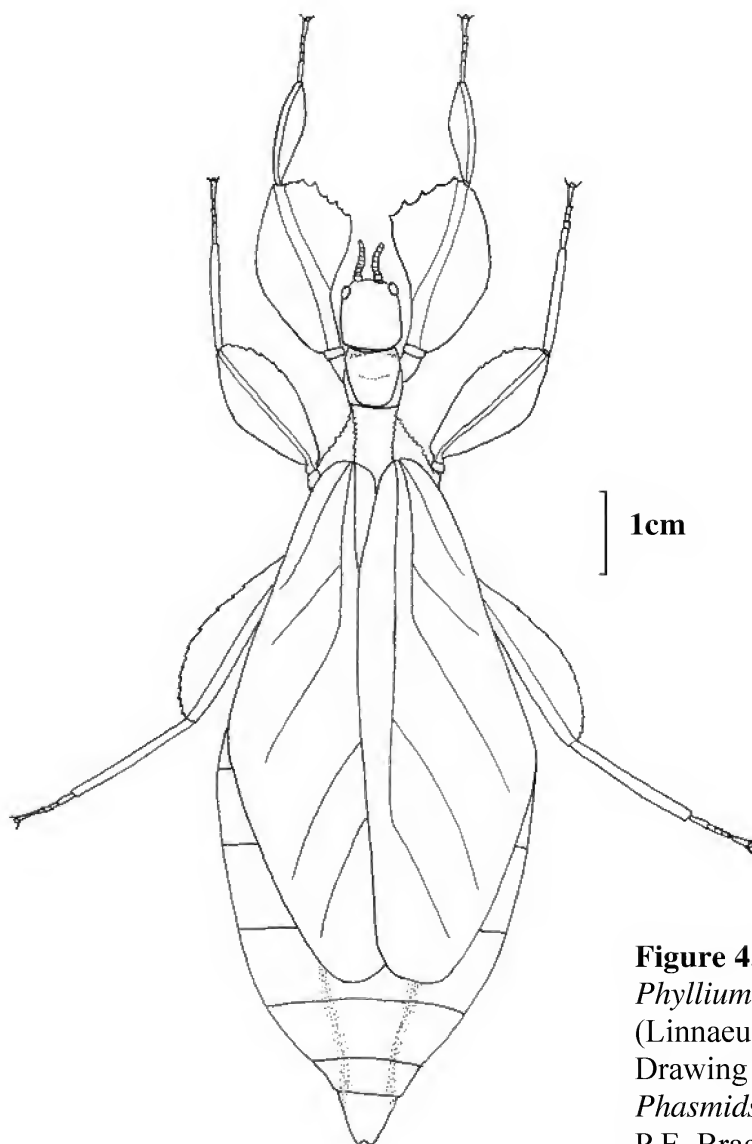


Figure 4.
Phyllium siccifolium
(Linnaeus, 1758) ♀.
Drawing taken from
Phasmids of Borneo by
P.E. Bragg (2001).

The phasmids of Linnaeus

Linnaeus divided the Insects into seven main groups; these were then split into smaller groups. These smaller groups are now referred to as genera and further divisions of these genera as subgenera. All the phasmids that Linnaeus described were placed in the genus *Gryllus*, and subgenus *Mantis*. Linnaeus elevated *Mantis* to a full genus in the 12th edition of *Systema Naturae* in 1767. In 1758 the genus *Gryllus* included phasmids, mantids, crickets, bush crickets, grasshoppers, and locusts; it is now restricted to some crickets. The subgenus *Mantis* contained all the phasmids (3) and praying mantids (7); the genus *Mantis* is now restricted to six species of praying mantids.

Linnaeus produced three publications naming new of phasmids species, *Systema Naturae* in 1758, and two separate publications in 1763. None of his phasmids were illustrated. *Systema Naturae* named three species. In 1763 Linnaeus described his fourth species of phasmid in two different publications. However, he used different names in the two publications, so he actually produced five species names. Linnaeus intended the name *necydaloides* to replace *brachypterus*, however, this was an unnecessary change and under the ICZN rules the earliest name, *brachypterus*, takes priority and is the valid name; the later name, *necydaloides*, is a junior synonym and should not be used.

The table below gives the original name of his phasmids, followed by the year and page number of the publication, and the current name.

Original name	Current name
<i>Gryllus Mantis gigas</i> 1758: 425.	<i>Phasma gigas</i> (Linnaeus, 1758)
<i>Grllus Mantis phthisicus</i> 1758: 425	<i>Pseudophasma phthisicum</i> (Linnaeus, 1758)
<i>Gryllus Mantis siccifolius</i> 1758: 425.	<i>Phyllium siccifolium</i> (Linnaeus, 1758)
<i>Gryllus Mantis brachypterus</i> 1763a: 14.	<i>Pseudophasma brachypterus</i> (Linnaeus, 1763)
<i>Gryllus Mantis necydaloides</i> 1763b: 397.	<i>Pseudophasma brachypterus</i> (Linnaeus, 1763)

The number of phasmids that Linnaeus originally had is unknown. Only six specimens survive; there are no known specimens of those currently placed in *Pseudophasma*. Uppsala contains one adult female *Phyllium siccifolium*, and one male, one adult female and one female nymph of *Phasma gigas*. The two specimens (one male and one female) in the Linnean Society, that were treated as *gigas* by Linnaeus, were later described as *Diapherodes scabricollis* by Gray, in 1835, because he decided they were different from other specimens of *gigas*.

References

- Brock, P.D.** (2002) Linnaean stick and leaf insect type material (Insecta: Phasmida). *Le Bulletin de Phyllie*, **1**(11): 3-14.
- Fitton M. & Harman, K.** (2007) The "Linnaean" insect collection. *Linnean*, Special Issue **7**: 47-58.
- Gray, G.R.** (1835) *Synopsis of the species of insects belonging to the family of Phasmidae*. Longmans, London.
- Linnaeus, C.** (1758) *Systema Naturae*, **10th Edition**. Holmiae.
- Linnaeus, C.** (1763a) *Centuria Insectorum Rariorum*. Upsaliae.
- Linnaeus, C.** (1763b) CXXI. Centuria Insectorum. *Amoenitates Academicae*, **6**: 384-415.
- Linnaeus, C.** (1767) *Systema Naturae*, **12th Edition**. Holmiae.
- Marshall, J.A.** (1983) The Orthopteroid insects described by Linnaeus, with notes on the Linnaean collection. *Zoological Journal of the Linnean Society*, **78**(4): 375-396.
- Thunberg, C.P.** (1784) *Dissertatio Entomologica, Novas Insectorum Species. Sistens. Cujus partem tertiam*. Upsaliae.
- Thunberg, C.P.** (1815) Hemipterorum maxillosorum genera illustrata. *Mémoires de l'Académie Impériale des Sciences de St.-Pétersbourg*, **Volume 5**.

Biographies of Phasmatologists – 6. Klaus Günther.

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Abstract

Klaus Günther (1907–1975) was a prolific phasmid taxonomist. His life and phasmid work is outlined. He described 24 new genera and 146 new species or subspecies of Phasmida and illustrated most of those species. His arrangement of the families, subfamilies and tribes of phasmids (1953) remained almost unchanged for 50 years.

Keywords

Phasmida, Phasmatologist, Klaus Günther, Biography.

Klaus Günther (1907–1975)

Klaus Günther was born in Wilmersdorf, Berlin on 7th October 1907. His father, Alfred Günther was a Landgerichtspräsident: the president of a district court. He married Elfriede Volprecht and they had three children: Klaus and his twin brother, Ulrich and a younger brother Eberhard. Their mother died when Eberhard was born in 1911.

Günther studied Zoology, Botany, Geography, Chemistry and Numismatics in Berlin. In his dissertation he worked on the mouthparts of Crustaceans. Beside his studies he started publishing papers on entomology, mostly with a faunistic-biogeographical background. From 1934 onwards he was the leader of the entomological department of the Museum für Tierkunde in Dresden. From 1942 on he also headed the numismatic museum. He kept both positions until 1946. Günther married his second wife, Hildegard Kaufhold, in 1935.

In 1948 he moved to the Institute of Genetics at the Humboldt-University of Berlin. From 1957 he was professor at the Zoological Institute of the Freie Universität Berlin. Between 1934 and 1944 he was the chief editor of the entomological journal “Iris”. Günther was mainly interested in evolution and biogeography. He was also interested in ecology, and he created the term “ecological niche”, which is nowadays well known, but hardly attributed to him. In his numerous works on the skulls of fishes he concentrated on functional anatomy, especially of deep-sea fish. He is the author of several important works on medieval coins.

In his private life Günther loved to travel to Greece. His second wife, Hildegard, died in January 1969 and in February of 1970 he married Waltraut Wolf. Shortly after remarrying, Günther retired early, in the middle of 1970, because of increasing health problems. In spite of this he kept on working, but because of his early death he could not finish many of the works he had started. Klaus Günther died in Berlin on 1st August 1975 at the age of 67.

Urich (1975) lists 130 zoological papers, mainly on phasmids and other orthopteroid insects, weevils, behaviour and skull anatomy of fish, published by Günther, and 20 on ancient to early medieval coins and cultural history. This list does not include chapters written to be included in other peoples' books.

Günther's phasmid publications

Between 1928 and 1953 Günther published 33 papers that dealt with phasmids: 26 dealt solely with phasmids while seven included other insects, mainly Orthoptera and earwigs. After 1953 he contributed chapters on phasmids to three books, one was a short chapter in which he described one new species in *South African Animal Life* (Günther, 1956a), the other two were different editions of a book on genitalia (Günther, 1956b & 1970). For a full list of



his phasmid works see the reference and bibliography at the end of this paper.

With such a large output, it is inevitable that there are some mistakes in some of his papers. Some examples of transcription or printer's errors are given below.

The Phasmids of Günther

Günther has been the most prolific phasmid taxonomist since Brunner von Wattenwyl and Josef Redtenbacher produced their three-part monograph in 1906-1908. He described 24 new genera and 146 new species or subspecies of phasmids; all but one described between 1928 and 1944, the exception being a single species in 1956.

Unlike many earlier authors, Günther illustrated almost every new species that he described, although many of the illustrations were limited to just part of the insect. Notable exceptions are his papers of 1938 and 1943; each contain only one illustration, and that in his 1938 paper is not of a new species. His two largest papers (1929, 1931) are indexed.

He worked on phasmids from most areas of the world. He did a significant amount of work on particular regions: Borneo (1932a, 1932b, 1932d, 1932e, 1935a, 1943a, 1944), New Guinea (1929, 1930b, 1936, 1937a), Oceania (1931, 1933, 37b), Celebes (1935c, 1939b), China, (1940b), South America (1930a, 1932f, 1940a). He also produced a large revision of the genus *Lonchodes* (1932c) and a comprehensive work on the families, subfamilies and tribes (1953).

Günther's arrangement of the higher taxa hardly altered for almost 50 years. It was used by Bradley and Galil (1977) as the basis for their keys to families, subfamilies and tribes; even today these remain the most recent comprehensive keys available, although there have been a number of significant changes in the past decade.

Günther published a number of synonyms, many of which are clearly wrong. He had a tendency to synonymise species just on the basis of the description, without examining the original specimens, particularly in the wingless phasmids. A striking example of this is with *Datames oileus* (Westwood, 1859), Günther (1934: 76) synonymised six other species with *oileus*. Although he had almost certainly not examined most of the original specimens (if any), he presumably assumed that they were just one variable species. In fact some of these seven species are so different that they are currently placed in three different genera (*Dares*, *Orestes*, & *Pylaemenes*)!

Notes on some specimens described by Günther

Most of the material described by Günther is in the museums he indicated. However, some of the material that he borrowed from other museums was not returned, Günther retained some duplicates. Specimens from at least one of his phasmid papers, including type specimens, have been destroyed. The 36 specimens of South American material that Günther (1932f) recorded and sent back to the Apolinar María Collection in Colombia was destroyed by a fire on 10th April 1942 (Yenny Rosas, *pers. com.*); this included the type specimens of two species: *Xera apolinari* Günther, 1932 and *Libethra tenuis* Günther, 1932.

Otte & Brock (2005) state that material of Günther's that should be in Calcutta has been lost; however, this is not the case: 22 of Günther's types are present in the Calcutta collection (Bragg & Mukherjee, in prep.) Furthermore, six of Günther's type specimens from Calcutta museum are now in Dresden Museum, having been retained by Günther (Zompro, 2003). With the exception of one male *Menexenus tenmalainus*, all Günther's types from Calcutta therefore still exist.

The majority of Günther's type material is housed in the museums of Hamburg and Dresden (Zompro, 2002, 2003).

New genera described by Günther

Günther described 24 new genera and also produced another generic name by mistake. The mistake appears to be a transcription error by Günther. The name *Poecilobactron* (Günther, 1953: 556) is a mixture of the genus and species name of a species, *Thaumtobactron poecilosoma*, which he described in 1929. The new genera that he described are listed alphabetically below.

Acanthograeffea Günther, 1931: 760.
Cylindomena Günther, 1935b: 139.
Dagys Günther, 1935c: 3.
Echinothorax Günther, 1931: 757.
Elicius Günther, 1935c: 16.
Eubias Günther, 1935c: 21.
Kalocorinnis Günther, 1944: 77.
Korinnis Günther, 1932a: 66.
Lobophasma Günther, 1935b: 139.
Miroceramia Günther, 1934a: 283.
Moritasgus Günther, 1935c: 19.
Mortites Günther, 1935c: 13.

Mylothrus Günther, 1935c: 18.
Nesiophasma Günther, 1934d: 5.
Ommatopseudes Günther, 1942: 323 (footnote)
Oreophasma Günther, 1929: 659.
Otraleus Günther, 1935c: 28.
Paraloxopsis Günther, 1932b: 317.
Pericentropsis Günther, 1936: 336.
Pseudopromachus Günther, 1929: 745.
Pterolibethra Günther, 1940a: 498.
Sinophasma Günther, 1940b: 240.
Thaumtobactron Günther, 1929: 663.
Woodlarkia Günther, 1931: 754.

New species and subspecies described by Günther

Günther described 146 new species and subspecies.

An example of a copying error in species names by Günther is with the name *Calvisia axillaris*; it appears on the label of one of the type series of specimens that was described as *Calvisia nigroaxillaris* Günther, 1943; this was further complicated by Günther listing the wrong number of specimens for this species (Bragg, 1996: 112; Bragg, 2001: 710). However, an error in his 1929 paper is probably the printer's error: *Lopaphus bürgersi* (Günther, 1929: 697) should read *Lopaphus bürgersi*, the first "r" has been missed out; the species is clearly named after the expedition leader Dr. Bürgers, and the name is correctly spelt in the contents list on page 600. Since the German letter "ü" does not exist in Latin, the ICZN Code modifies the spelling to *buergersi*. However, the umlaut is only changed when used in German words; Günther (1935) used *mjöbergi* to name a species after Dr. Eric Mjöberg who was Swedish, so the spelling of the specific name should be *mjöbergi*, not *mjoebergi*.

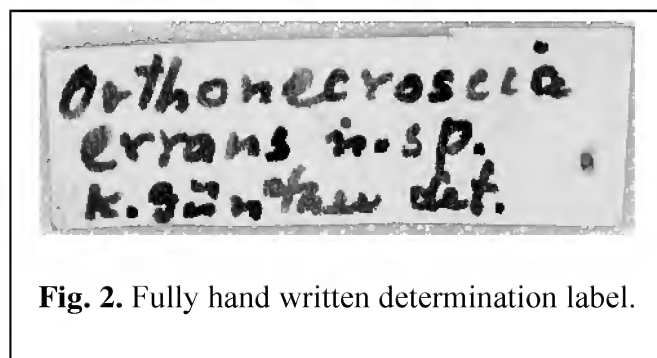


Fig. 2. Fully hand written determination label.

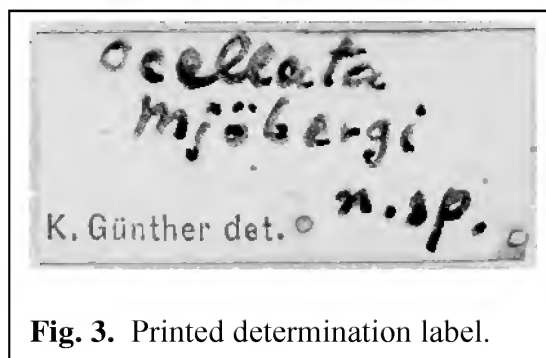


Fig. 3. Printed determination label.

Below are lists of the species and subspecies described by Günther. The new species are arranged alphabetically by species name within each year group, the genus is given in brackets; new subspecies are listed under the list of species.

1928

rex (*Eucarcharus*)1928: 218, with drawing on page 220.

1929 species

<i>annulatus</i> (<i>Hermarchus</i>)	1929: 689.	<i>olbiotyphus</i> (<i>Neopromachus</i>).....	1929: 646, fig 12.
<i>biroi</i> (<i>Neopromachus</i>)	1929: 736.	<i>oreitrephes</i> (<i>Hermarchus</i>).....	1929: 687, pl. 6.
<i>bürgersi</i> (<i>Lopaphus</i>).....	1929: 697.	<i>pachynotus</i> (<i>Neopromachus</i>)	1929: 657, pl. 5.1.
<i>bürgersi</i> (<i>Neopromachus</i>)	1929: 641, fig 9.	<i>paradoxus</i> (<i>Neopromachus</i>)	1929: 651.
<i>doederleini</i> (<i>Graeffea</i>).....	1929: 684, fig 3.1-2.	<i>parvulus</i> (<i>Neopromachus</i>)	1929: 637, fig 5.
<i>dyselius</i> (<i>Neopromachus</i>).....	1929: 654, fig 14.	<i>poecilosoma</i> (<i>Thaumatolectron</i>)	1929: 663,
<i>elegans</i> (<i>Neopromachus</i>)	1929: 634, fig 2, pl. 1.1-2.	fig 16-17 & pl. 7.1-2.
<i>epombrus</i> (<i>Neocles</i>).....	1929: 696.	<i>polyacanthum</i> (<i>Oreophasma</i>)	1929: 659.
<i>excellens</i> (<i>Sipyloidea</i>).....	1929: 693, pl. 1.4.	<i>rammei</i> (<i>Periphetes</i>).....	1929: 661, pl. 2.1 & 2.2.
<i>flavostriatus</i> (<i>Dimorphodes</i>)	1929: 677.	<i>ramuensis</i> (<i>Neopromachus</i>)	1929: 735.
<i>gibbosus</i> (<i>Neopromachus</i>)	1929: 653,	<i>riparius</i> (<i>Neopromachus</i>).....	1929: 633, fig 1.
.....	fig 13 & pl. 7.5.	<i>scharreri</i> (<i>Neopromachus</i>).....	1929: 639, fig 8, pl. 1.3.
<i>gracilis</i> (<i>Neopromachus</i>)	1929: 635, figs 3-4.	<i>velatus</i> (<i>Neopromachus</i>)	1929: 655 fig 15.
<i>mirus</i> (<i>Neopromachus</i>).....	1929: 644, figs 10-11.	<i>xanthopteryx</i> (<i>Apterrhidaeus</i>) ...	1929: 681, pl. 2.3-4.
<i>neglectus</i> (<i>Neopromachus</i>)	1929: 648.	<i>zernyi</i> (<i>Neopromachus</i>).....	1929: 638, figs 6-7.
<i>nigrogranulatus</i> (<i>Neopromachus</i>) ...	1929: 647, pl.7.4.		

1929 subspecies

<i>vepres flabellatus</i> (<i>Neopromachus</i>)	1929: 649, pl. 5.2 n.ssp. of <i>N. vepres</i> (Brunner, 1907).
<i>vepres olivaceus</i> (<i>Neopromachus</i>).....	1929: 650. n.ssp. of <i>N. vepres</i> (Brunner, 1907).
<i>coriacea maluensis</i> (<i>Eurycantha</i>)	1929: 673. n.ssp. of <i>E. coriacea</i> Redtenbacher, 1908.
<i>prostasis dorsatus</i> (<i>Dimorphodes</i>).....	1929: 676. n.ssp. of <i>D. prostasis</i> Westwood, 1859.
<i>galbanus monticola</i> (<i>Erastus</i>)	1929: 681. n.ssp. of <i>E. galbanus</i> Redtenbacher, 1908.

1930 species

<i>acanthonota</i> (<i>Ocnophila</i>)	1930a: 567, fig 9.	<i>posthumus</i> (<i>Neopromachus</i>).....	1930b: 747, figs 7-8.
<i>dendrokomus</i> (<i>Mirophasma</i>).....	1930a: 560, figs. 3-4.	<i>reticulata</i> (<i>Sipyloidea</i>)	1930b: 735, fig 3.
<i>exiguus</i> (<i>Neopromachus</i>)	1930b: 747, fig 1.	<i>viridimaculatus</i> (<i>Stratocles</i>)	1930a: 561, fig 5.
<i>gymnota</i> (<i>Jeremia</i>).....	1930a: 568, fig 10.	<i>xanthotaenidium</i> (<i>Pseudophasma</i>)..	1930a: 563, fig 6.
<i>mayri</i> (<i>Thaumatolectron</i>).....	1930b: 732, fig. 2.		

1930 subspecies

<i>erringtoniae novaeguineae</i> (<i>Haaniella</i>)	1930b: 737, figs 4-5. n.ssp. of <i>H. erringtoniae</i> (Redtenbacher, 1906).
<i>hosei papuanus</i> (<i>Lonchodes</i>)	1930b: 739, fig 6. n.ssp. of <i>L. hosei</i> Kirby, 1896.

1931

<i>modesta</i> (<i>Acanthograeffea</i>).....	1931: 777, fig. 2.	<i>meridionalis</i> (<i>Ophicrania</i>)	1931: 779, fig. 3.
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1932

<i>apolinari</i> (<i>Xera</i>).....	1932f: 227, pl. 9.9.	<i>potameis</i> (<i>Korinnis</i>).....	1932a: 67, fig. 1.
<i>korystes</i> (<i>Paraloxopsis</i>).....	1932b: 318, fig. 1.	<i>tenuis</i> (<i>Libethra</i>)	1932f: 246, pl. 10.8 & 11.25-26.
<i>montis rajae</i> (<i>Apورا</i>)	1932d: 265, fig. 4.	<i>titschacki</i> (<i>Galactea</i>)	1932e: 153.
<i>oreibates</i> (<i>Orthonecroscia</i>).....	1932a: 71, fig 2.	<i>winkleri</i> (<i>Galactea</i>)	1932e: 149, figs 1 & 2.

1933

<i>australe</i> (<i>Phasmotaenionema</i>)	1933: 155, figs. 1-4.
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1934 species

- eremothocus* (*Nesiophasma*)..... 1934d: 6, fig 1. | *perminutus* (*Neopromachus*) 1934a: 286.
exigua (*Parasipylloidea*)..... 1934c: 528, fig 1. | *pterobrimus* (*Miroceramia*) 1934a: 284, fig 1.

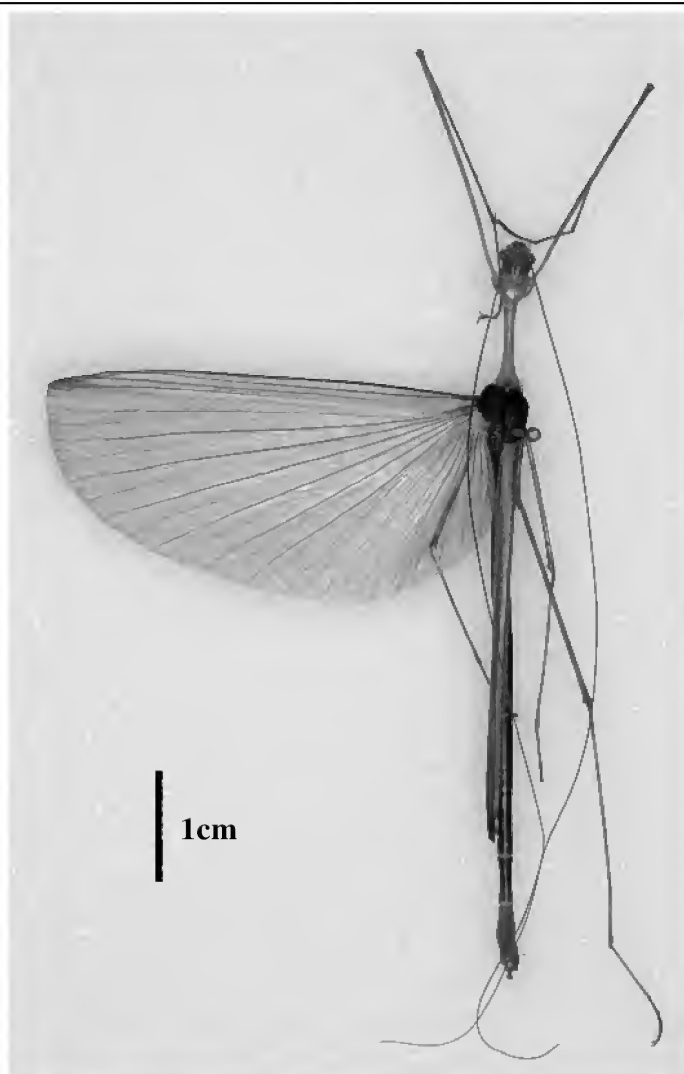
1934 subpecies

- insularis verrucifer* (*Leprocaulus*) 1934b: 82. n.ssp. of *L. insularis* (Kirby, 1896).
insularis talaudiensis (*Leprocaulus*) 1934b: 79. n.ssp. of *L. insularis* (Kirby, 1896).

1935

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|---|---|
| <i>athlius</i> (<i>Eubias</i>) 1935c: 22. pl. 2.14 | <i>monticola</i> (<i>Necroscia</i>)..... 1935a: 17, figs 3a & 3b. |
| <i>balia</i> (<i>Dagys</i>)..... 1935c: 3, pl. 1.1. | <i>obsolefactum</i> (<i>Prisomera</i>) 1935c: 4, fig. |
| <i>celebensis</i> (<i>Neopromachus</i>)..... 1935c: 14. | <i>oligarches</i> (<i>Mylothrus</i>) 1935c: 18. |
| <i>chloë</i> (<i>Necroscia</i>) 1935a: 20, fig. 5a & 5b. | <i>parastatidon</i> (<i>Periphetes</i>) 1935c: 11. fig. |
| <i>enarges</i> (<i>Mortites</i>)..... 1935c: 13. | <i>potameis</i> (<i>Necroscia</i>) 1935a: 19, fig 4. |
| <i>epidicus</i> (<i>Menexenus</i>)..... 1935c: 5, pl. 1.3. | <i>rammei</i> (<i>Nescicroa</i>) 1935c: 26. |
| <i>hariola</i> (<i>Sipylloidea</i>) 1935c: 23, pl. 2.15. | <i>scalprifera</i> (<i>Cylindomena</i>)..... 1935b: 139, fig 5a & 5b. |
| <i>heinrichi</i> (<i>Carausius</i>) 1935c: 6, pl. 1.4. | <i>sjostedti</i> (<i>Presbistus</i>) 1935a: 5, fig. 1. |
| <i>heinrichi</i> (<i>Nescicroa</i>) 1935c: 25, pl.2.17. | <i>stresemanni</i> (<i>Moritasgus</i>) 1935c: 20 pl. 2.13. |
| <i>hypsimelethrus</i> (<i>Otraleus</i>) 1935c: 28, pl.2.18. | <i>tenella</i> (<i>Necroscia</i>)..... 1935c: 24, pl. 2.16. |
| <i>microbasileus</i> (<i>Elicius</i>) 1935c: 17. | <i>tibangensis</i> (<i>Necrosciodes</i>).... 1935a: 21, figs 6a & 6b. |
| <i>mjöbergi</i> (<i>Orthonecroscia</i>) 1935a: 23, figs 7a-b. | <i>willemsei</i> (<i>Parapygirhynchus</i>).... 1935b: 125 figs. 2-4. |

Fig. 4. *Orthonecroscia mjobergi* Günther, 1935, syntype male in Dresden Museum. This species was published as *Orthonecroscia mjobergi* but the specimen was labelled by Günther (see fig 3) as *Ocellata mjobergi*. *Ocellata* Redtenbacher, 1908 is a junior synonym of *Orthonecroscia* Kirby, 1904.



1936

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|--|---|
| <i>aculeata</i> (<i>Pericentropsis</i>)..... 1936: 336, fig. 13. | <i>laetus</i> (<i>Neopromachus</i>)..... 1936: 331, fig 9. |
| <i>echinata</i> (<i>Trapezaspis</i>)..... 1936: 335, fig. 12. | <i>robusta</i> (<i>Sipyloidea</i>)..... 1936: 343, fig. 17. |
| <i>extraordinarius</i> (<i>Neopromachus</i>) ..1936: 326, fig 1. | |

1937

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|---|---|
| <i>carli</i> (<i>Heterocopus</i>) 1937a: 83, figs. 1-2. | <i>leveri</i> (<i>Ophicrania</i>) 1937b: 5, fig. 3. |
| <i>injucundus</i> (<i>Neopromachus</i>) 1937a: 93. | <i>schlaginhaufeni</i> (<i>Neopromachus</i>) 1937a: 91. |
| <i>iuxtavelatus</i> (<i>Neopromachus</i>) 1937a: 88, fig 2. | |

1938

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|--|---|
| <i>acanthonotus</i> (<i>Sipyloidea</i>) 1938: 138. | <i>lobatipes</i> (<i>Ignacia</i>)..... 1938: 124. |
| <i>annandalei</i> (<i>Asceles</i>) 1938: 136. | <i>nitida</i> (<i>Sipyloidea</i>)..... 1938: 137. |
| <i>errans</i> (<i>Korinnis</i>)..... 1938: 125. | <i>ocellata</i> (<i>Sosibia</i>) 1938: 139. |
| <i>errans</i> (<i>Orthonecroscia</i>) 1938: 140. | <i>tenmalainus</i> (<i>Menexenus</i>)..... 1938: 127. |
| <i>glaber</i> (<i>Asceles</i>)..... 1938: 135. | |

1939 species

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|--|--|
| <i>aberrans</i> (<i>Staelonchodes</i>) 1939b: 77, fig 15. | <i>nodosum</i> (<i>Prisomera</i>) 1939b: 79, fig.16-17. |
| <i>aptera</i> (<i>Hemiplastra</i>)..... 1939b: 90, fig 21-22. | <i>sarasinorum</i> (<i>Menexenus</i>).... 1939b: 70, figs 10-11. |
| <i>exiguus exiguus</i> (<i>Menexenus</i>) .. 1939b: 72, fig. 13. | <i>sarasinorum</i> (<i>Hemiplastra</i>)..... 1939b: 88, fig.19-20. |
| <i>fruhstorferi</i> (<i>Sipyloidea</i>)..... 1939b: 85, fig. 18. | |

1939 subspecies

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|---|--|
| <i>exiguus alienigena</i> (<i>Menexenus</i>)..... 1939b: 73, fig. 12. n.ssp. of <i>M. exiguus</i> Günther, 1939. | |
| <i>horridus horridus toliensis</i> (<i>Menexenus</i>)..... 1939b: 68, figs 8-9. n.ssp. of <i>M. horridus</i> Brunner, 1907. | |
| <i>horridus maribulla</i> (<i>Menexenus</i>) 1939b: 65, figs 4-6. n.ssp. of <i>M. horridus</i> Brunner, 1907. | |
| <i>horridus toliensis</i> (<i>Menexenus</i>)..... 1939b: 67, fig 7. n.ssp. of <i>M. horridus</i> Brunner, 1907. | |

1940

- | | |
|--|--|
| <i>acheloa</i> (<i>Libethra</i>)..... 1940a: 496, fig.19. | <i>involuta</i> (<i>Micadina</i>)..... 1940b: 238, fig. A, H. |
| <i>adelpha</i> (<i>Sipyloidea</i>) 1940b: 245. | <i>klapperichi</i> (<i>Sinophasma</i>) 1940b: 240, figs B,K,F,N. |
| <i>brevipenne</i> (<i>Sinophasma</i>)..... 1940b: 244, figs E,L,G. | <i>mirabile</i> (<i>Sinophasma</i>)..... 1940b: 242, figs C, J. |
| <i>difficilis</i> (<i>Micadina</i>) 1940b: 237. | <i>poeciloptera</i> (<i>Phantasca</i>) 1940a: 500. |
| <i>glabra</i> (<i>Phasgania</i>) 1940b: 246. | <i>tacanae</i> (<i>Isagoras</i>)..... 1940a: 494. |
| <i>heteronemia</i> (<i>Pterolibethra</i>) 1940a: 499. | <i>waehneri</i> (<i>Bacteria</i>)..... 1940a: 495, fig 18. |
| <i>honei</i> (<i>Sinophasma</i>)..... 1940b: 243, figs D, M. | |

1942

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| <i>paradoxus</i> (<i>Ommatopseudes</i>) 1942: 323. fig 15. |
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1943

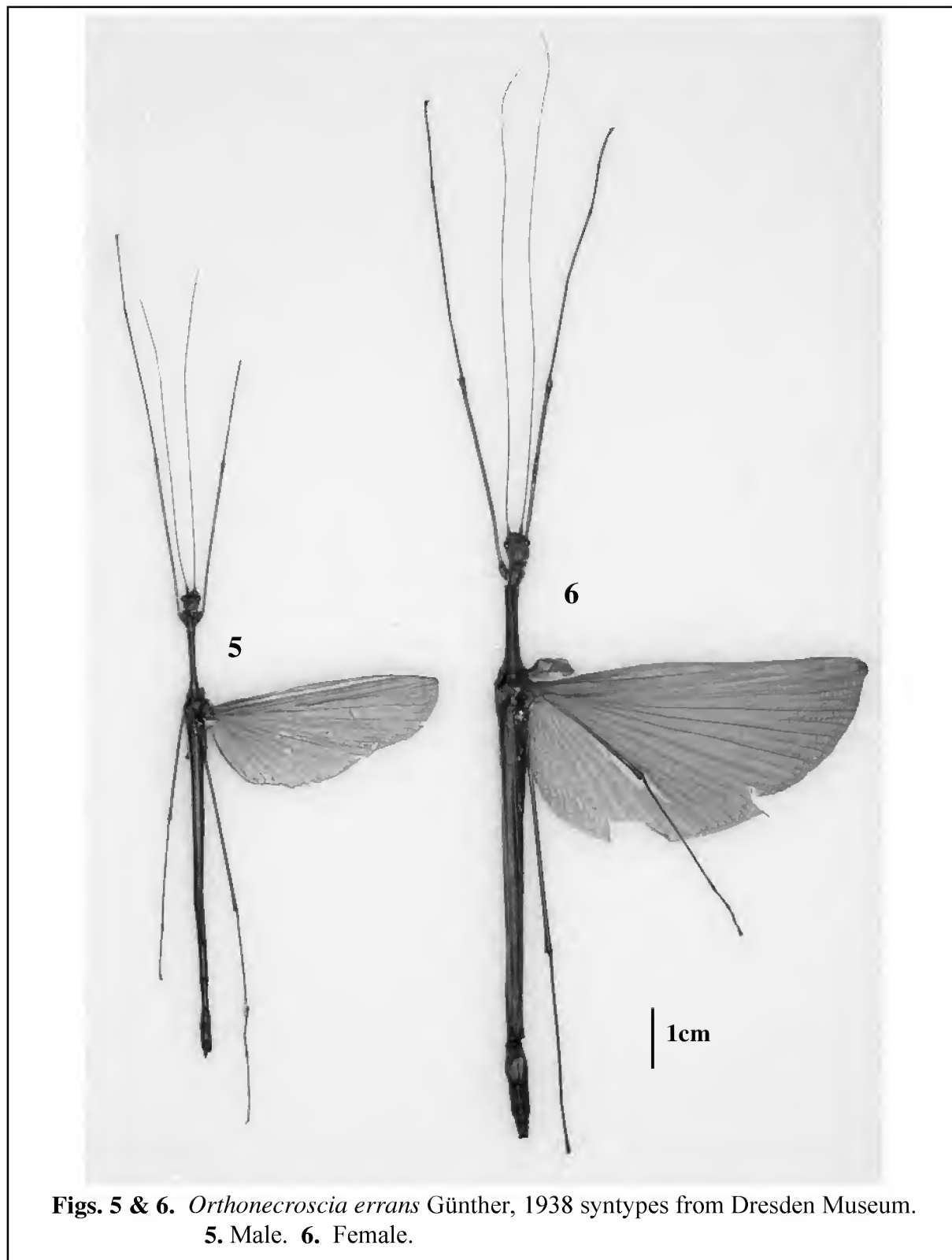
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|---|---|
| <i>coeruleomaculata</i> (<i>Orthonecroscia</i>) 1943a: 166. | <i>nieuwenhuisi</i> (<i>Orthonecroscia</i>) 1943a: 167. |
| <i>croceomaculata</i> (<i>Paradiacantha</i> (?))..... 1943a: 160. | <i>nigroaxillaris</i> (<i>Calvisia</i>)..... 1943a: 169. |
| <i>dajak</i> (<i>Lonchodes</i>)..... 1943a: 153. | <i>speciosa</i> (<i>Orthonecroscia</i>) 1943a: 168. |
| <i>flavogranulosa</i> (<i>Necroscia</i>) 1943a: 164. | <i>spiniger</i> (<i>Neocles</i> (?))..... 1943a: 158, fig. 1. |
| <i>neglecta</i> (<i>Apora</i>)..... 1943a: 152. | <i>viridimaculatus</i> (<i>Syringodes</i>)..... 1943a: 156. |

1944

<i>calopteryx</i> (<i>Kalocorinnis</i>)	1944: 78, fig. 5.	<i>longipennis</i> (<i>Centema</i>)	1944: 78.
<i>jacobsoni</i> (<i>Haaniella</i>)	1944: 73, figs. 3 & 4.	<i>parva</i> (<i>Haaniella</i>)	1944: 73, fig. 2.

1956

rubrotaeniatus (*Ramulus*) 1956a: 90, figs 1-5.



Figs. 5 & 6. *Orthonecroschia errans* Günther, 1938 syntypes from Dresden Museum.
5. Male. 6. Female.

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References & Bibliography of Günther's phasmid publications

- Bradley, J.C. & Galil, B.S. (1977)** The taxonomic arrangement of the Phsmatodea with keys to the subfamilies and tribes. *Proceedings of the Entomological Society of Washington*, **79**: 176-208.
- Bragg, P.E. (1996)** Type specimens of Phasmida in Nationaal Natuurhistorisch Museum, Leiden (Insecta: Phasmida). *Zoologische Mededelingen Leiden*, **70**: 105-115.
- Bragg, P.E. (2001)** *Phasmids of Borneo*. Natural History Publications (Borneo), Kota Kinabalu, Sabah.
- Bragg, P.E. & Mukherjee, T. (in prep.)** Catalogue of phasmid types in Kolkata Musuem.
- Brunner von Wattenwyl, K. (1907)** *Die Insektenfamilie der Phasmiden*. Vol. 2. Wilhelm Engelmann, Leipzig.
- Günther, K. (1928)** Eine neue Stabheuschrecke aus Sumatra. *Konowia*, **7**: 218-222.
- Günther, K. (1929)** Die Phasmoïden der Deutschen Kaiserin Augusta-Fluss-Expedition 1912/13. Ein Beitrag zur Kenntnis der Phasmoidenfauna Neuguineas. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **14**: 600-746, plates 1-7.
- Günther, K. (1930a)** Neue und wenig bekannte Phasmoiden von Sudamerika. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **15**: 559-570.
- Günther, K. (1930b)** Weitere Beiträge zur Kenntnis der Phasmoidenfauna Neu Guineas. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **15**: 729-747.
- Günther, K. (1931)** Beiträge zur Systematik und Geschichte der Phasmoïdenfauna Ozeaniens. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **17**: 753-835.
- Günther, K. (1932a)** Die von Professor Dr. H. Winkler 1924/25 in Zentralborneo gesammelien Phasmoiden. *Zoologischer Anzeiger*, **101**(3/4): 65-73.
- Günther, C. (1932b)** Phasmoiden des Kina Balu auf Borneo, aus dem Hamberger Zool. Museum. *Wiener Entomologische Zeitung*, **49**(4): 313-320.
- Günther, K. (1932c)** Revision des Genus *Lonchodes* Gray (Orth. Phasm.). *EOS Madrid*, **8**: 367-389.
- Günther, K. (1932d)** Das Genus *Apora* Br. (Orth. Phasm.). *Konowia*, **11**(4): 260-265.
- Günther, K. (1932e)** 2 neue Arten der Gattung *Galactea* Redt. mit allgemeinen Bermerkungen über dieses Genus. (Orth. Phasm.). *Mitteilungen der Deutschen Entomologische Gesellschaft*, **3**(10): 149-158.
- Günther, K. (1932f)** Columbianische Phasmoïden aus der Sammlung des Rev. Apolinar María. Mit einer Uebersicht über das Genus *Libethra* Stål. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **18**: 226-261.
- Günther, K. (1933)** Über eine kleine Sammlung von Phasmoiden und Forficuliden aus Melanesien. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, **44**(2): 151-164.
- Günther, K. (1934a)** Beitrag zur Kenntnis malayisch-papuanischer Phasmoiden und Forficuliden. *Konowia*, **13**: 283-289.
- Günther, K. (1934b)** Phasmoïden von den Talaud-Inseln und von der Insel Morotai, mit kritischen Bemerkungen über einzelne Arten und einem zoogeographischen Anhang. *Sitzungsberichte der Gesellschaft naturforschender Freunde*, pp. 75-94.
- Günther, K. (1934c)** Phasmoiden und Forficuliden von Java, den Kleinen Sundainseln und Nordaustralien. *Revue Suisse de Zoologie*, **41**: 525-537.
- Günther, K. (1934d)** Eine neue Stabheuschrecke von Kalao Tua. Nebst Bermerkungen über ihre systematische und zoogeographische Stellung. *Mitteilungen der Deutschen Entomologische Gesellschaft*, **5**: 5-9.
- Günther, K. (1934e)** Über die Variabilität bei Phasmoiden und anderen Orthopteren und ihre Folgen für dei Systematik. *Entomologische Beihefte Berlin-Dahlem*, **1**: 100-105.
- Günther, K. (1935a)** Phasmoiden aus Centralborneo. *Arkiv för Zoologi*, **28A**(9): 1-29.
- Günther, K. (1935b)** Ueber einige Phasmoiden aus der Sammlung des Herrn Dr. C. Willemse, Eijgelshoven. *Natuurhistorisch Maandblad Maastricht*, **24**: 123-126 & 138-140.

- Günther, K. (1935c)** Die von Gerd Heinrich 1930-1932 auf Celebes gesammelten Phasmoïden. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **21**: 1-29, pl. 1-2.
- Günther, K. (1936)** Phasmoiden und Acrydiinen (Orthoptera) von Holländisch Neu Guinea - Hauptsächlich aus den Ausbeuten der Herren Docters van Leeuwen (1926), van Heurn (1920), P.N. van Kampen und K. Gjellerup (1910). *Nova Guinaea. Résultats des Expéditions Scientifiques à la Nouvelle Guinée*, **17**(3): 323-352.
- Günther, K. (1937a)** Die von Dr. Schlaginhaufen 1909 in Neuguinea gesammelten Phasmoiden (Orth.). *Vierteljahrsschrift der Naturf. Gesellschaft in Zürich*, **82**: 77-97 & plate 1.
- Günther, K. (1937b)** Über einige Orthopteren von den Solomon-Inseln und von Vanikoro. *Mitteilungen der Deutschen Entomologische Gesellschaft*, **8**: 3-10.
- Günther, K. (1938)** Neue und wenig bekannte Phasmoiden aus dem Indian Museum Calcutta. *Records of the Indian Museum*, **40**: 123-141.
- Günther, K. (1939a)** Beitrag zur Kenntnis der Fortpflanzungsbiologie der Stabheuschrecke *Orexines mackloti* de Haan. *Verhandlungen VII International Kongress für Entomologie, Berlin 1938*, **2**: 1156-1169.
- Günther, K. (1939b)** Orthoptera Celebica Sarasiniana. II Phasmoidae. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, **49**: 54-92.
- Günther, K. (1940a)** Über die Verbreitung einiger Insekten im Gebiete des Amazonasstromes und die Frage eines colombischen Faunendistriktes in der brasilianischen Subregion. *Archiv für Naturgeschichte*, N.F. **9**: 450-500.
- Günther, K. (1940b)** Neue Stabheuschrecken (Phasmoïden) aus China. *Decheniana*, **99B**(2): 237-248.
- Günther, K. (1942)** Über Faktoren der Formendifferenzierung sowie ökonomische und luxurierende Typen bei Insekten. *Photographie und Forschung*, **3**: 313-325.
- Günther, K. (1943a)** Die Phasmoiden (Orthoptera) der "Borneo-expedition Dr. Nieuwenhuis" aus dem Stromgebiet des oberen Mahakam. *Eos Madrid*, **19**: 149-172.
- Günther, K. (1943b)** Hexapoda, Orthoptera, Famille Phasmidae. in *Parc National Albert I Mission G.F. de Witte 1933-1935*. **43**(2): 5-6.
- Günther, K. (1944)** Bemerkungen über indomalayische Stabheuschrecken (Orth.), besonders die Gattung *Haaniella* Kby. *Stettin Entomologische Zeitung*, **105**: 68-79.
- Günther, K. (1953)** Über die taxonomische Gliederung und die geographische Verbreitung der Insektenordnung der Phasmatodea. *Beiträge zur Entomologie*, **3**(5): 541-563.
- Günther, K. (1956a)** Chapter 3, Phasmatoptera. pp. 87-93. In **Hanstrom, B., Brinck, P. & Rudebeck, G.** *South African Animal Life, results of the Lund University expedition in 1950-1951*.
- Günther, K. (1956b)** Cheleutoptera (Phasmoidea). pp. 11-16 & 49-52, in **Tuxon, S.L.** *Taxonomist's glossary of genitalia in insects*. [1st edition] Ejnar Munksgaard, Copenhagen.
- Günther, K. (1970)** Chapter 12, Cheleutoptera (Phasmoidea). pp. 58-61, in **Tuxon, S.L.** *Taxonomist's glossary of genitalia in insects*. [2nd edition] Ejnar Munksgaard, Copenhagen.
- Otte, D. & Brock, P. (2005)** *Phasmida Species File, Catalog of Stick and Leaf Insects of the World*. Insect Diversity Association, Philadelphia.
- Redtenbacher, J. (1906)** *Die Insektenfamilie der Phasmiden*. Vol. **1**. Wilhelm Engelmann, Leipzig.
- Redtenbacher, J. (1908)** *Die Insektenfamilie der Phasmiden*. Vol. **3**. Wilhelm Engelmann, Leipzig.
- Urich, K. (1975)** Klaus Günther (7.x.1907 – 1.viii.1975). *Zoologische Beiträge*, **21**: 347-361.
- Zompro, O. (2002)** Catalogue of type material of the insect order Phasmatodea at the Zoologisches Museum der Universität Hamburg (Insecta: Orthoptera: Phasmatodea). *Mitteilungen des Hamburger Zoologischen Museums und Instituts* **99**: 179-201.
- Zompro, O. (2003)** Catalogue of type-material of the insect order Phasmatodea deposited in the Museum für Tierkunde, Dresden, Germany. *Phasmid Studies*, **11**(2): 31-44.

Notes on *Necroscia punctata* (Gray, 1835) and *Necroscia bistriolata* (Redtenbacher, 1908)

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Abstract

Necroscia punctata (Gray, 1835) and *Necroscia bistriolata* (Redtenbacher, 1908) are two species that were synonymised by Günther in 1935 but removed from synonymy by Brock in 1996. The species are compared and illustrated. The type series of *bistriolata* contains at least two species which could explain why the synonym was first proposed. A lectotype is selected for *Aruanoidea bistriolata* Redtenbacher, 1908. The status of *N. punctata* in Borneo is reviewed.

Key words

Phasmida, *Necroscia punctata*, *Necroscia bistriolata*, *Aruanoidea bistriolata*, Lectotype, Borneo, Sumatra, Java, Peninsular Malaysia.

Introduction

Necroscia punctata (Gray, 1835) was described from a single male. The holotype in the Natural History Museum, London (BMNH) is in poor condition, it lacks mid legs, hind and the abdomen. From what remains it is not possible to identify the species with certainty: there are too many similar species.

The species was described from the East Indies (Indiâ Orientali), a rather vague locality. The British presence in Malaysia and Singapore in the 1830s means there is a good possibility that this is the source of Gray's specimen; particularly as *Necroscia annulipes* (Gray, 1835), which was also described from the East Indies (albeit from a different private collection), is a very distinctive species found in Mainland Malaysia. Sumatra, Cambodia and Thailand, the other subsequently recorded localities for *annulipes*, are unlikely sources for specimens imported to Britain in the 1830s.

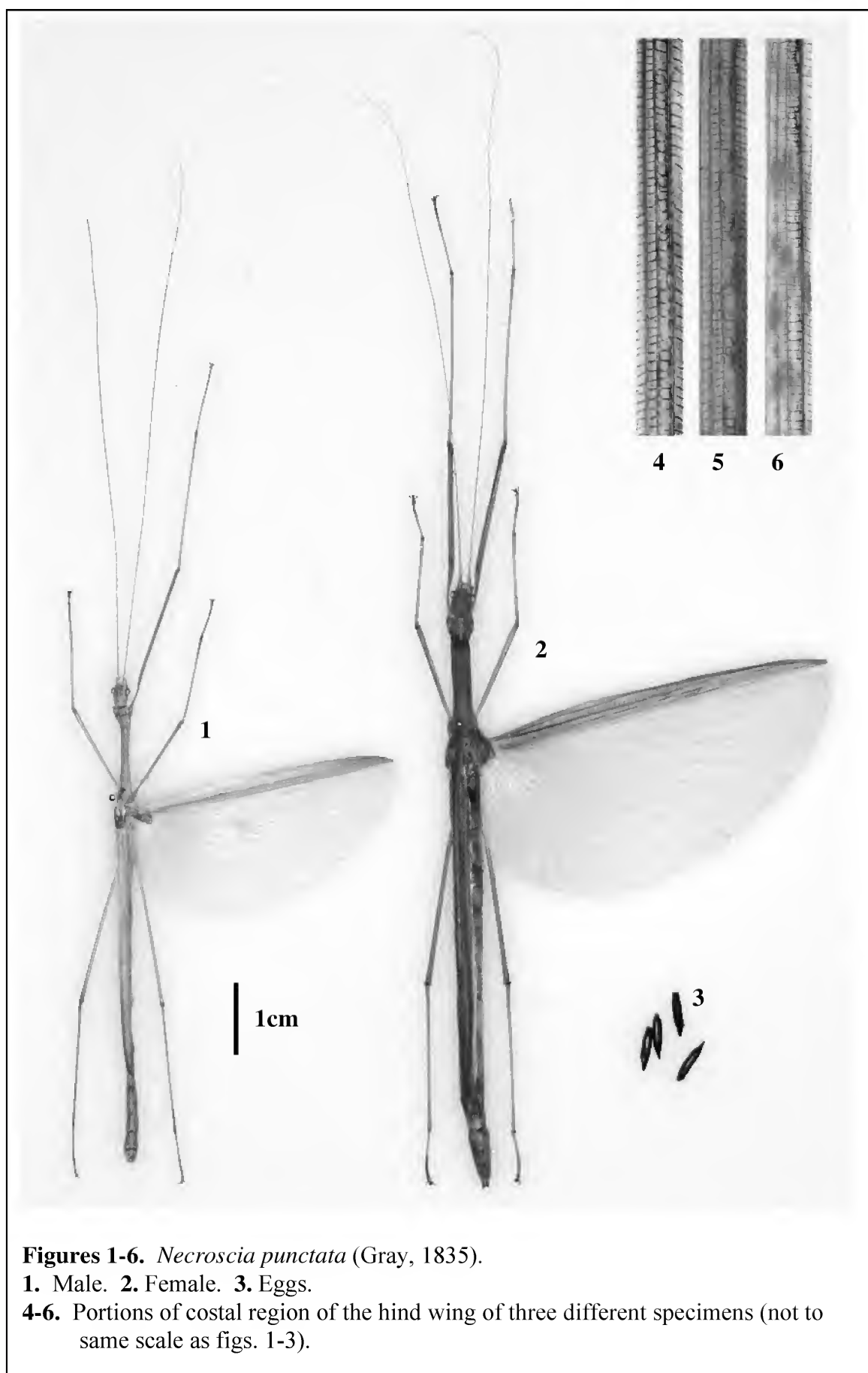
Brock (1999) gives a key to the species of *Necroscia* in Mainland Malaysia and Singapore and a brief description of *N. punctata*. Since Malaysia is a very likely source for Gray's specimen, it is reasonable to assume that Brock has correctly identified the species.

Complications with *Necroscia punctata*

The coloration of *punctata* is quite variable. Although often fairly plain green, mottled specimens are quite common and Brock states that red, yellow and brown specimens occur. There are a considerable number of mottled species of *Necroscia* in South East Asia. Illustrations of *punctata* in Brock's (1999) and in Seow-Choen's (2000) books are not sufficiently detailed to be of use for identifying the species outside Peninsular Malaysian and Singapore.

One of the complications is that historically, mottled species were often assumed to be *punctata*; for example, de Haan (1842) recorded three variations of *punctata* based on coloration, two of these were later named as distinct species: *N. haanii* Kirby, 1904 from Borneo, and *N. horsfieldii* from Java. Another mottled species, *N. westwoodii* Kirby, 1904 from Singapore, was also originally thought to be *punctata* by Westwood (1859: 142).

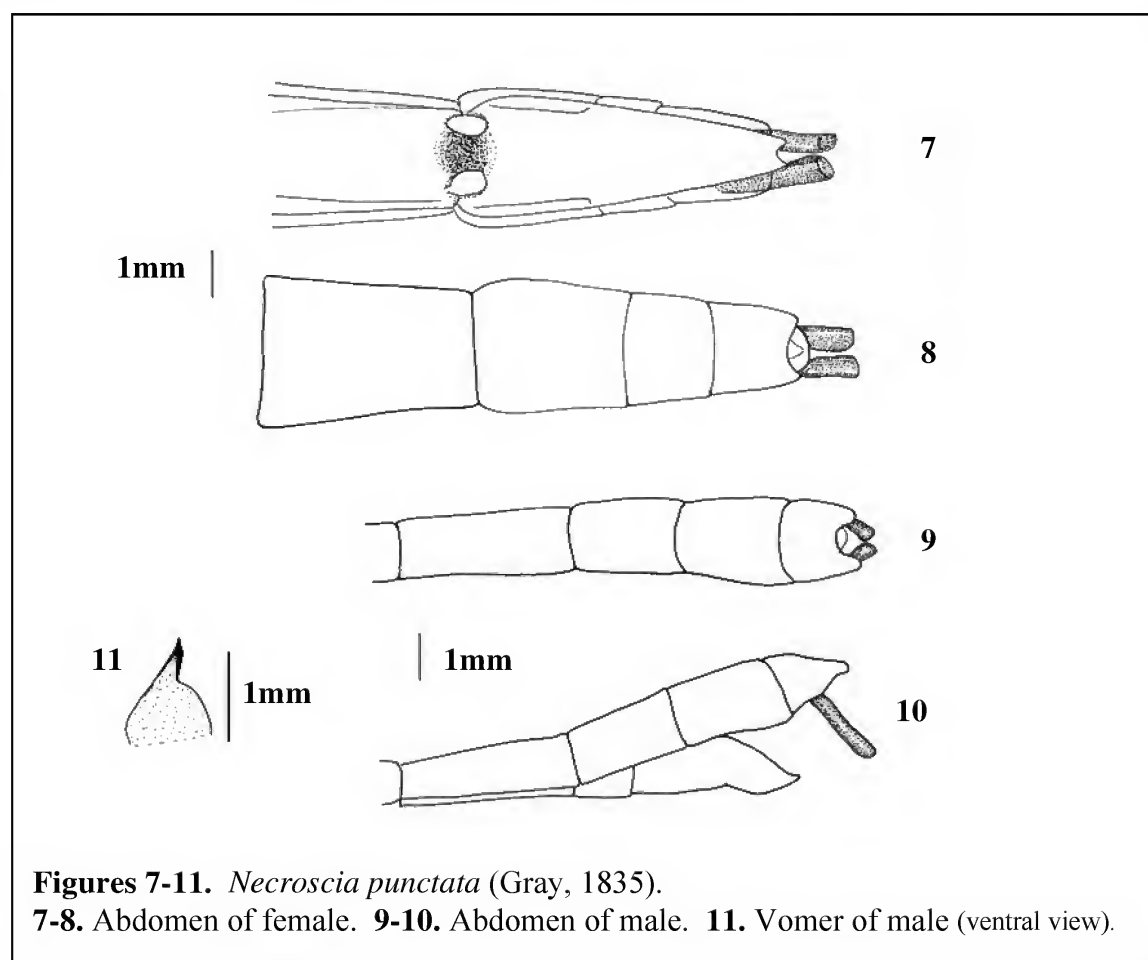
In his 1935 paper on Bornean species, Günther synonymised *Aruanoidea bistriolata* Redtenbacher, 1908 (described from Java and Sumatra) with *Necroscia punctata* (Gray). In 1996 Brock said that Günther was in error and reinstated *Necroscia bistriolata* (Redtenbacher, 1908) as a valid species. Having recently examined three of the type specimens of *bistriolata*, I found both authors were wrong – or both correct depending on one's point of view! In fact, of the three I have examined, one is very similar to *punctata* and the other two are clearly a different species.



The status of *Necroscia punctata* as a Bornean species

My main interest is in Bornean species and *punctata* is one of several mottled species to be recorded from the island. However, although I have collected *punctata* in both Singapore and Peninsular Malaysia, I have yet to see a specimen from Borneo.

Redtenbacher (1908: 528) recorded a specimen of *punctata* from Borneo in Berlin Museum (ZMHB); this specimen was also examined by Günther (1935: 14). I have examined this specimen and found it is clearly not *punctata*. Redtenbacher's specimen is the same as a specimen in my own collection that I had, until very recently, treated as *Necroscia haanii*. However, when I put them under the microscope to do drawings of my specimens of *haanii*, intending to include them here, I was surprised to find that they appear to be three different, but superficially similar, species. Which of the three is the true *haanii* I will only be able to determine by re-examining the type material. Fortunately, the three species are from very different localities and I have both sexes from each locality.



Figures 7-11. *Necroscia punctata* (Gray, 1835).

7-8. Abdomen of female. **9-10.** Abdomen of male. **11.** Vomer of male (ventral view).

Günther's (1935) record of *punctata* in Borneo included Redtenbacher's specimen (above) and he considered the three type specimens of *bistriolata* in Berlin Museum to be the same species. This raises serious doubt about the identity of the other Bornean specimens that Günther identified as *punctata*.

There are three other records of *punctata* from Borneo. Westwood (1859) recorded *punctata* from Sarawak but, as the female he described at the same time was later found to be a different species (*N. westwoodii*), this is an unreliable record. Westwood did not say which museum contains the Sarawak material but I recently visited Oxford (OXUM) and found two specimens from Sarawak labelled *punctata*, the female is clearly not *punctata*, the male lacks the abdomen so cannot be identified with certainty but is patterned very similarly to one of

my *haanii*-like specimens. *Aruanoidea tenera* Redtenbacher, 1908 was synonymised with *punctata* by Brock (1996); Hausleithner (1991) recorded *tenera* from Kinabalu Park HQ, Sabah but this is suspect because *tenera* had not been recorded from Borneo previously and one of my *N. haanii*-like species occurs in the Park HQ area. *Necrosia chloe* Günther, 1935 was described from Borneo and Brock (1996) synonymised it with *punctata*; however, the synonym is based on material in Leiden Museum not on Günther's type material; Günther's illustration of the abdomen of this species is too small for identification.

***Necrosia punctata* (Gray, 1835) (figs 1-13, & 25)**

Platycrana punctata Gray, 1835: 37. Holotype ♂ (BMNH) East Indies.

Aruanoidea tenera Redtenbacher, 1908: 528. Synonymised by Brock, 1996: 90.

Necrosia chloë Günther, 1935: 20, fig. 5a-b (♂). Synonymised by Brock, 1996: 90.

Aruanoidea adspersa Redtenbacher, 1908 3: 528. Synonymised by Brock, 1999: 190.

[*Aruanoidea bistriolata* Redtenbacher, 1908: 528. Synonymised by Günther, 1935a: 13 - in error].

Material examined:

♂ Holotype (BMNH) East Indies.

♀ (PEB-2774) WEST MALAYSIA, Cameron Highlands. 1997. [Bought from dealer, price £2.00].

♂ (PEB-2379) WEST MALAYSIA, Pahang, Tasik Chini. P.E. Bragg, 16-10-1994.

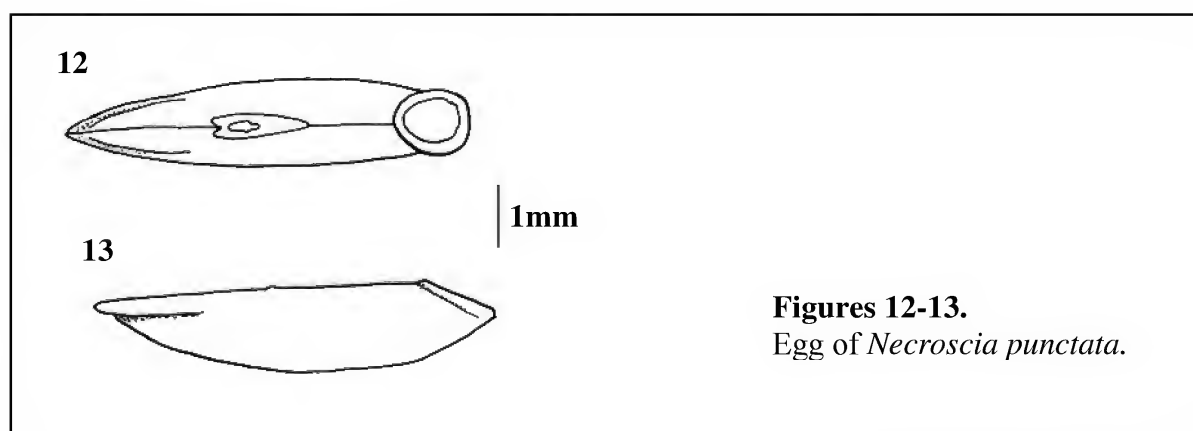
♂ (PEB-1507) SINGAPORE, Nee Soon, Swamp Forest. P.E. Bragg, 25-07-1992.

♀ & eggs (PEB-2398), ♀ (PEB-2397), ♂ (PEB-2387) SINGAPORE, Upper Pierce Reservoir. P.E. Bragg, 18.x.1994.

2♀♀ with eggs removed from the body (PEB-3092, PEB-3093) SINGAPORE, Upper Pierce Reservoir. P.E. Bragg, 28.vii.2001.

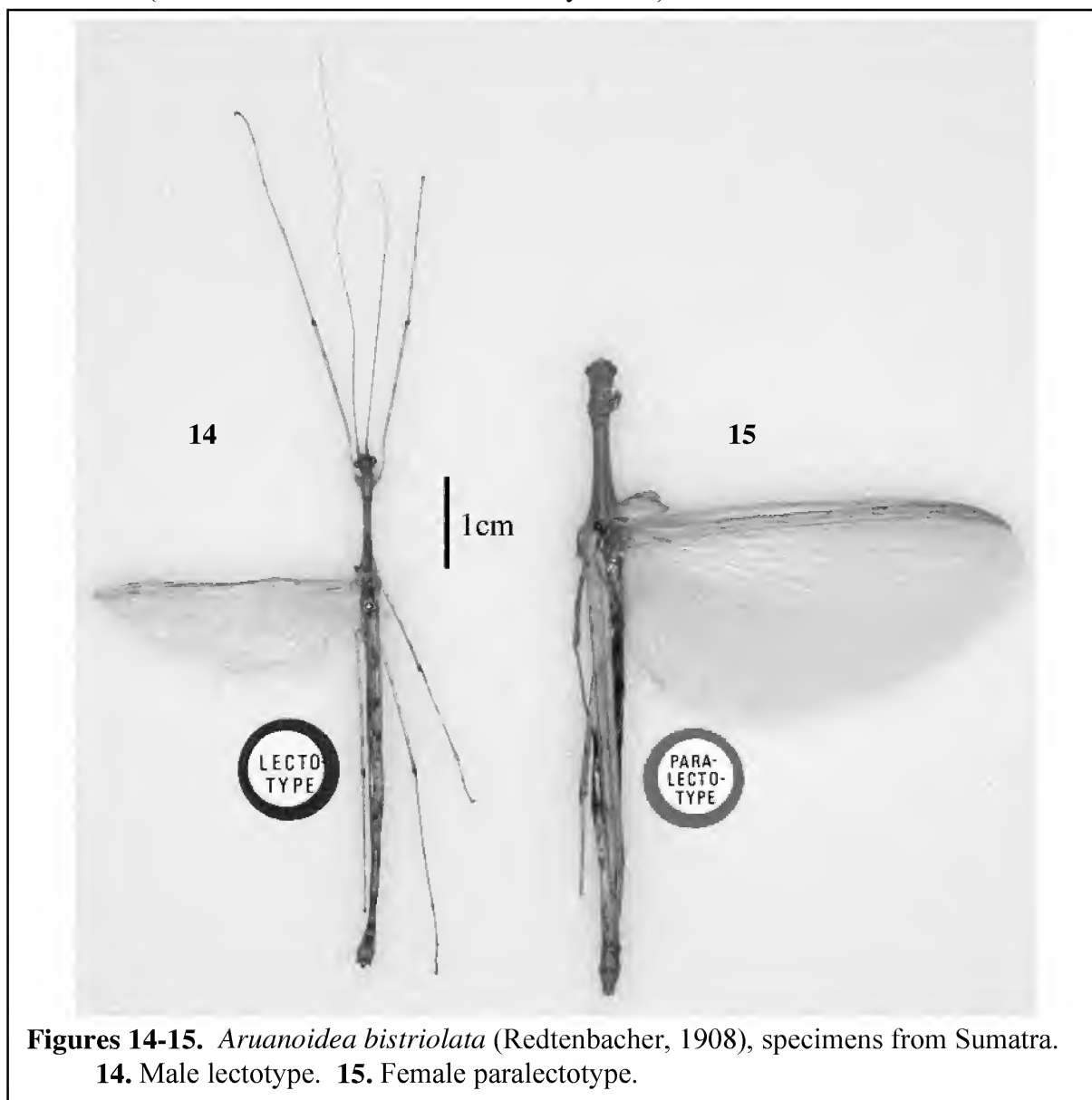
Female: Body length 74-91mm. The wings reach half way along 7th tergite. The female has a very distinct praepopercular organ which is composed of a deep hollow and two large oval swellings. The hollow is formed by a depression in the 7th sternite and an indentation of anterior margin of the operculum. The oval swellings lie almost parallel to each other, longitudinal to the body (fig. 7). The apices of the cerci are very angular, almost rectangular.

Male: Body length 64-67mm. Wings reach to half way along 6th tergite. Anal segment (excluding processes) about half as long as 9th tergite; posterior margin with a concave curve, with a rounded extension on the corners. The 11th segment is clearly visible as a rounded lobe (fig. 9). Cerci clubbed (broadest at apices). Vomer unispinose (fig. 11).



***Necroscia bistriolata* (Redtenbacher, 1908)** (figs 14-24)

Aruanoidea bistriolata Redtenbacher, 1908: 528, plate 27, fig 11 (♂ abdomen). **Lectotype** ♂ from Sumatra (ZMHB – Berlin) [**here selected** – data below]. Paralectotypes: ♀ from Sumatra, ♀ from Java (ZMHB); 2♀♀ from Sumatra, 5♂♂ & 3♀♀ from Java (NHMW – Wien); ♂ & ♀ from Java (ISBN - Brussels); several ♂♂ & ♀♀ from Sumatra & Engano Island (MCSN – Genoa); 2♂♂ & 3♀♀ from Java (SMNS – Stuttgart). The paralectotypes represent at least two species. For details of the type data see Brock (1998: 18), except for types in Berlin which are listed below (and seem to have been overlooked by Brock).



Figures 14-15. *Aruanoidea bistriolata* (Redtenbacher, 1908), specimens from Sumatra.
14. Male lectotype. **15.** Female paralectotype.

Material examined:

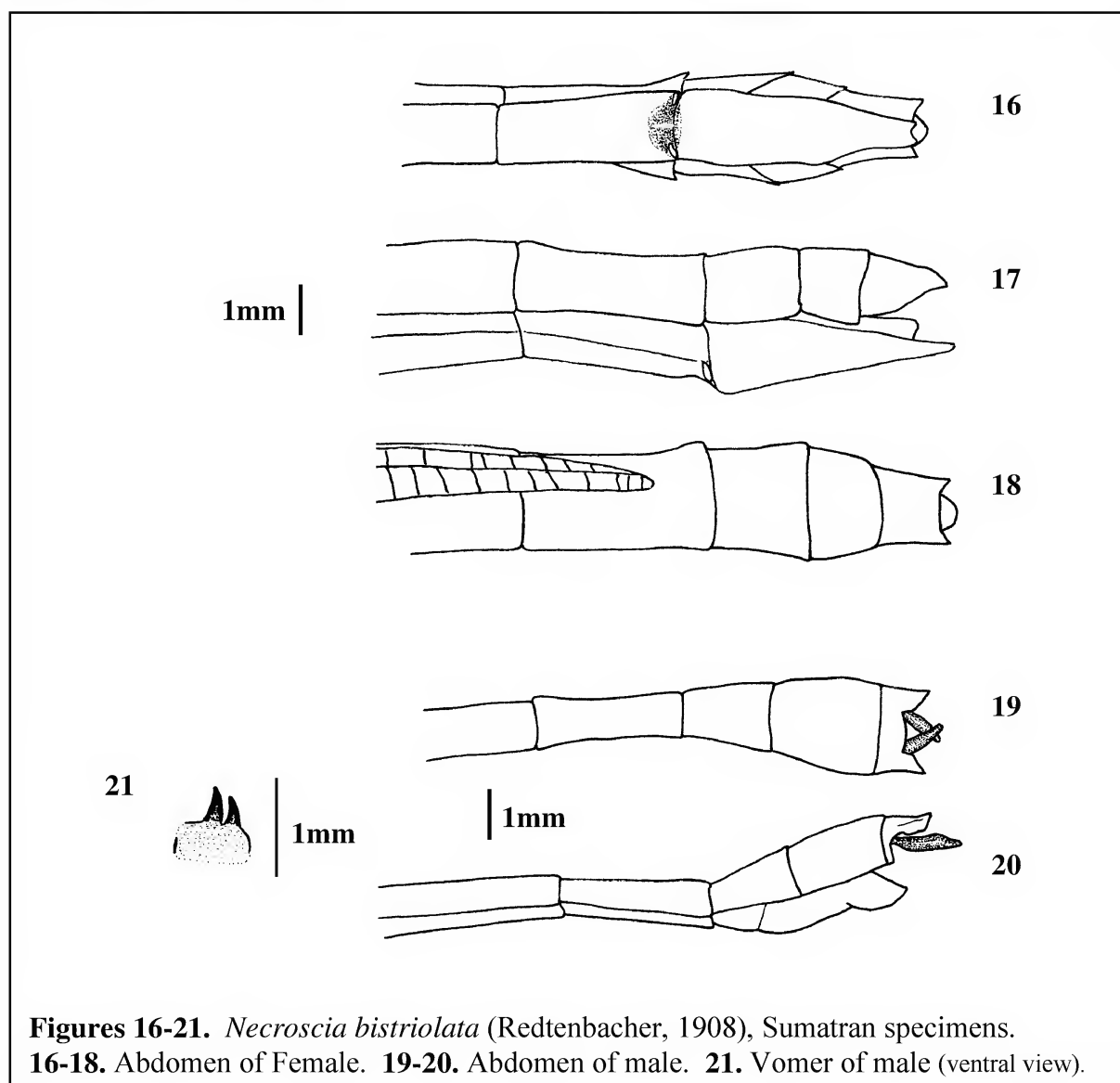
♂ Lectotype (ZMHB) SUMATRA, Deli. Hartert. Fruhstorfer.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks left hind leg, and front right and mid left tarsi].

♀ Paralectotype (ZMHB) OST-SUMATRA, Glen Bervi in Beneden Langkat. Ernst von Beneden.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks all right legs, left fore leg, all tarsi, antennae and cerci, and hind tibia is broken].

♀ (OXUM) SUM.; E. coll.(1830-73) W.W. Saunders. Purchased and pres. '73 by Mrs. F.W. Hope.

♀ Paralectotype (ZMHB) JAVA Occident., Sukabumi 2000, 1893 H. Fruhstorfer.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks mid & fore legs].

I have only examined the three types in the Berlin collection; I do not know to which species the other types belong, but I suspect the Javan and Sumatran specimens will be different species. The OXUM female had been misidentified as *punctata* but is the same species as the paralectotype from Sumatra.

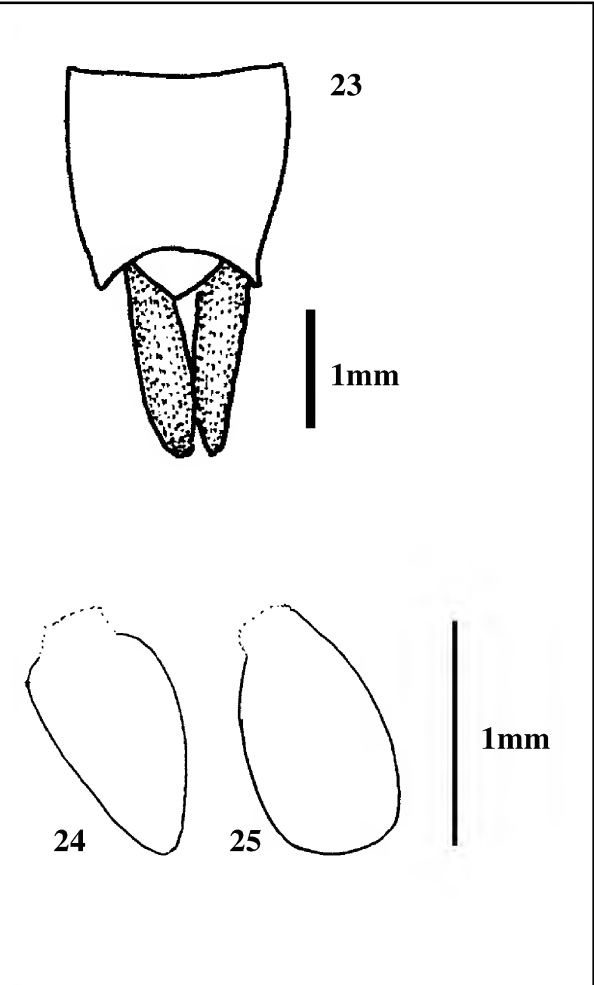
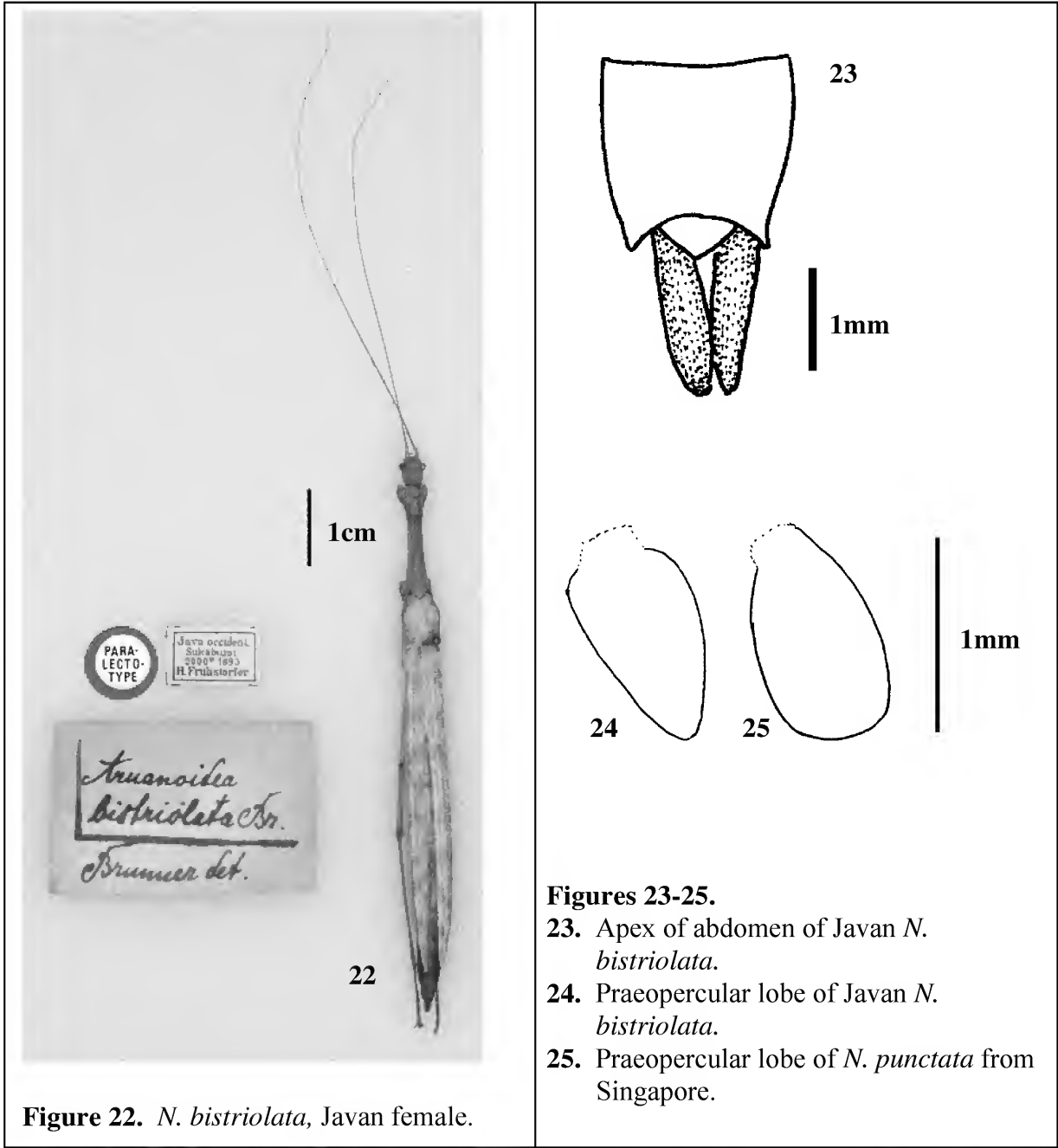


Figures 16-21. *Necroscia bistriolata* (Redtenbacher, 1908), Sumatran specimens.
16-18. Abdomen of Female. **19-20.** Abdomen of male. **21.** Vomer of male (ventral view).

The Sumatran female has a praepercular organ composed of a deep hollow divided by a narrow, longitudinal ridge, the anterior margin of the operculum is more or less convex and only very slightly incised to form part of the hollow; on each lateral margin of the hollow there is a small oval swelling, these lie transverse to the body (fig. 16). The wings reach slightly more than half way along the 7th tergite. The cerci are missing from this specimen.

The male was originally pinned with legs pointing in all directions, which is probably why it had been damaged and repaired in the past. It was in need of further repair so I took the opportunity to reset the specimen with the legs straightened to reduce the risk of future damage, and opened a wing. Male body length 55mm; full measurements in table 1: lengths of the metanotum and median segment are approximate as they are partly obscured by the unopened wing. The wings reach to the end of the 5th tergite. Anal segment very short, about one quarter as long as 9th tergite (excluding processes); posterior margin almost straight, with a very distinctive long point on the corners. Cerci circular in cross-section, of almost uniform diameter, apices rounded. Vomer bispinose (fig. 21).

Table 1. Measurements of the Berlin Sumatran types, in mm.					
	♂	♀		♂	♀
Total length	55	68	Fore femur	17.1	-
Antennae	> 45	-	Fore tibia	16.0	-
Head	2.6	3.3	Fore tarsus	8.2	-
Pronotum	2.5	3.5	Mid femur	10.9	13.0
Mesonotum	8.6	10.4	Mid tibia	10.0	11.2
Metanotum	circa 4.1	6.2	Mid tarsus	5.2	-
Median segment	circa 3.3	5.2	Hind femur	15.2	19.1
Fore wing	3.3	6.1	Hind tibia	14.6	-
Hind wing	28	44	Hind tarsus	7.5	-



The female from Java (figs. 22-24) is very similar to *Necrosia punctata* (Gray), but there are quite a number of differences. The differences may be due to geographical variation; comparison of the males would be necessary to decide if they are distinct species. The coloration is the same as the Sumatran *bistriolata* specimens, this is not inconsistent with the variable coloration of *punctata*. The praeopercular organ is almost identical to *punctata* but differs by the oval lobes being more pointed (figs. 23-24) and by the presence of a slightly raised densely setose area (sensory?) in the middle of the hollow; the lamina supraanalis is shorter and triangular (fig. 25) rather than rounded; the wings are longer, reaching to the end of the 8th tergite (compared to only half way along 7th); the body is relatively broad; the apices of the cerci are not as angular as my *punctata* specimens. The body length is 70mm.

Acknowledgements

I am grateful to Dr. Michael Ohl (ZMHB) for the loan of specimens.

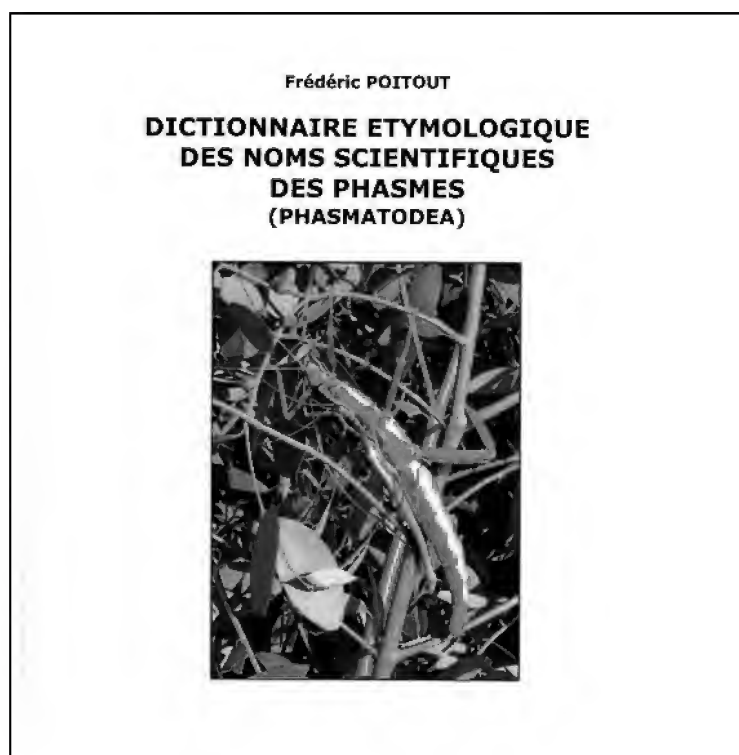
References

- Brock, P.D. (1996)** Catalogue to stick and leaf-insects (Insecta: Phasmida) associated with Peninsular Malaysia and Singapore. *Malayan Nature Journal*, **49**(2): 83-102.
- Brock, P.D. (1998)** *Catalogue of type specimens of stick- and leaf-insects in the Naturhistorisches Museum Wien (Insecta: Phasmida)*. Naturhistorisches Museum Wien, Austria.
- Brock, P.D. (1999)** *Stick and leaf insects of Peninsular Malaysia and Singapore*. Malaysian Nature Society, Kuala Lumpur.
- Gray, G.R. (1835)** *Synopsis of Phasmidae*. Longmans, London.
- Günther, K. (1935)** Phasmoiden aus Centralborneo. *Arkiv för Zoologi*, **28A**(9): 1-29.
- Haan, W. de (1842)** Bijdragen tot de Kennis Orthoptera. in C.J. Temminck, *Verhandelingen over de natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen*. volume **2**.
- Hausleithner, B. (1991)** Eine Phasmidenausbeute aus dem Gebiet des Mount Kinabalu, Borneo (Phasmatodea). *Nachrichten des Entomologischen Vereins Apollo, Frankfurt, N.F.* **11**(4): 217-236.
- Kirby, W.F. (1904)** *A synonymic Catalogue of Orthoptera*. Vol. **1**. British Museum (Natural History), London.
- Redtenbacher, J. (1908)** *Die Insektenfamilie der Phasmiden*. Vol. **3**. Wilhelm Engelmann, Leipzig.
- Seow-Choen, F. (2000)** *An illustrated guide to the stick and leaf insects of Peninsular Malaysia and Singapore*. Natural History Publications (Borneo), Kota Kinabalu.
- Westwood, J.O. (1859)** *Catalogue of the Orthopterous Insects in the Collection of British Museum. Part I: Phasmidae*. British Museum, London.

Reviews and Abstracts.

Book Review

Dictionnaire Etymologique de Noms Scientifiques des Phasmes (Phasmatodea), by **Frédéric Poitout**. Available as a PDF file on CD, 702 pages [In French], from F. Poitout, 51 rue Montaigne, 24450 La Coquille, France. Price €10, payable to “Association Phyllie”.
Reviewed by P.E. Bragg.



This dictionary of etymology of phasmid names looks at the origin of all generic and specific names used for phasmids. It has been produced by an etymologist, rather than by a phasmatologist with access to the original publications. As a consequence the information given is often based solely on the etymological root of the name and does not indicate the reasoning behind the name, thus *megabeast* is said to be a combination of the Greek *mega* and English *beast*: in fact the name was based on the English colloquial use of *mega* (meaning impressive) rather than the Greek meaning of *mega* (large). In

some instances the origin of the name is given as “unknown” although the etymology may have been explained when the name was published. The introductory section lists specific names that are based on people and the detailed section gives more details on the people concerned. However, some of this is pure speculation, for example, *leei* is said to named after “Mr Lee, a contemporary English entomologist” – in fact Dr Lee is a Malaysian Mechanical Engineer! Again, because primary sources have often not been used, some basic errors have crept in, for example the name *hebertii* is in the list: it should be *herberti*.

Allowing for these limitations, and bearing in mind the majority of names will be based on the classical meaning of their name, this is a useful tool that will save time for anyone interested in knowing the origin of a name. The author has asked to be informed of any mistakes or corrections so that the text can be updated. I understand from the author that an English version is planned for 2008. Having spent many hours over the years searching for the origin of names, I am certain that I will find this work useful – even *en le français*.

Phasmid Abstracts

The following abstracts briefly summarise articles that have recently appeared in other publications. Some of these may be available from local libraries. Others will be available in university or college libraries, many of these libraries allow non-members to use their facilities for reference purposes free of charge.

The editor of *Phasmid Studies* would welcome recent abstracts from authors so that they may be included in forthcoming issues. In the case of publications specialising in phasmids, such as *Phasma*, only the longer papers are summarised.

Andersen, D.H., Pertoldi, C., Loeschke, V. & Scali, V. (2005) Characterization of microsatellite loci in the stick insects *Bacillus rossius rossius*, *Bacillus rossius redtenbacheri* and *Bacillus whitei* (Insecta: Phasmatodea). *Molecular Ecology Notes*, **5**(3): 576-578.

Five microsatellite markers were obtained from a dinucleotide enriched genomic library of the stick insect *Bacillus rossius rossius*. The markers were tested in three species of *Bacillus*. All loci were polymorphic when tested across species. The number of alleles at each locus was low (maximum four alleles), but different allelic patterns were observed among the species.

Andersen, D.H., Pertoldi, C., Loeschke, V. & Scali, V. (2006) Developmental instability, hybridization and heterozygosity in stick insects of the genus *Bacillus* (Insecta; Phasmatodea) with different modes of reproduction. *Biological Journal of the Linnean Society*, **87**(2): 249-259.

Several genetic factors are assumed to influence developmental instability (DI). One is the level of heterozygosity, with higher levels often being associated with decreased DI; another is genetic incompatibility in hybrids, which in several cases has been shown to increase DI. The genus *Bacillus* includes species which have both amphigonic heterozygous reproducing populations and homozygous parthenogenetic reproducing populations (*B. rossius rossius* and *B. r. redtenbacheri*). Furthermore, *Bacillus* includes hybrid parthenogenetic species, which have very high levels of almost fixed heterozygosities (*B. atticus*, *B. whitei*, *B. lynceorum*). We investigated the phenotypic variance (σ^2_p) and the impact of hybridization and level of heterozygosity on DI in females from these populations and species of *Bacillus*. DI was estimated as fluctuating asymmetry (FA) for three bilateral traits: the labial palpus, the maxillary palpus and the antenna. For the labial palpus and maxillary palpus we found, in general, a lower level of DI in the amphigonic females compared with parthenogenetic counterparts from the same species and with parthenogenetic females from the three hybrid species. A higher DI of the antenna was found in the hybrid species when compared with both parthenogenetic and amphigonic populations of the nonhybrid species, suggesting that the genes controlling antenna development are located on the sex chromosomes. The development of the investigated bilateral characters in the hybrid species seemed to be affected more by factors relating to genetic incompatibilities as a consequence of hybridization than by the stabilizing force of increased heterozygosity. Only few differences in σ^2_p were observed, supporting the possibility that the observed differences in DI are related mainly to internal genetic factors.

Baum, E., Dressler, C. & Beutel, R.G. (2007) Head structures of *Karoophasma* sp (Hexapoda, Mantophasmatodea) with phylogenetic implications. *Journal of Zoological Systematics and Evolutionary Research*, **45**(2): 104-119.

External and internal head structures of adults of *Karoophasma* sp. were examined and described. The results are compared with conditions found in other representatives of Mantophasmatodea and members of other lower neopteran groups. The X-shaped apodeme of the frons, the unpigmented oval area enclosed by apical branches of the anterior tentorial arms, the oval sclerotisation at the base of the labrum, the sclerotized rounded apical part of the galea, and the loss of M. labroepipharyngalis are probably autapomorphic for Mantophasmatodea. Plesiomorphic features (groundplan of Neoptera) are the orthognathous condition, the absence of parietal ridges, the absence of a gula, the absence of a 'perforation of the corpotentorium', the multisegmented antennae inserted between the compound eyes, the general arrangement of the mouthparts, the shape and composition of the maxillae and labium, and the nearly complete set of muscles. The presence of a transverse muscle connecting the antennal ampullae is a potential synapomorphy of Orthoptera, Phasmatodea and Dictyoptera. Character states suggesting affinities with Grylloblattodea are the absence of ocelli, the elongation of the corpotentorium, and the very similar mandibles with widely separated bases and completely reduced molae. Whether predacious habits are a synapomorphic feature of Mantophasmatodea and Grylloblattodea is uncertain. The retained orthognathous condition in Mantophasmatodea and Mantodea is likely related with different specialized preying techniques in both groups, i.e. rapid forward pushes of the head-prothorax complex, and the use of raptorial legs, respectively.

Baum, E., Hertel, W. & Beutel, R.G. (2007) Head capsule, chephalic central nervous system and head circulatory system of an aberrant orthopteran, *Prosarthria teretrirostris* (Caelifera, Hexapoda). *Zoology (Jena)*, **110**(2): 147-160.

The head capsule, the circulatory system and the central nervous system of the head of *Prosarthria teretrirostris* (Proscopiidae) is described in detail, with special consideration of modifications resulting from the aberrant head shape. The transformations of the head are completely different from those found in phasmatodeans, which are also characterised by twig mimesis. The circulatory system is distinctly modified. A hitherto undescribed additional structure in the posterior head region very likely functions as a pulsatile organ. The cephalic central nervous system is strongly elongated, with changes in the position of the suboesophageal ganglion, the corpora cardiaca and the course of the nervus mandibularis. Three-dimensional reconstructions of these two organ systems in combination with the pharynx were made using Alias (R) Maya 6.0 (TM) software. Comparisons with other representatives of Caelifera suggest a clade comprising Proscopiidae and Morabinae. The presence of a transverse muscle connecting the antennal ampullae in *Prosarthria* shows that this structure likely belongs to the groundplan of Orthoptera, even though it is missing in different representatives of this group. The transverse ampullary muscle is a potential synapomorphy of Orthoptera, Phasmatodea and Dictyoptera.

Beutel, Rolf.G. & Gorb, S.N. (2006) A revised interpretation of the evolution of attachment structures in Hexapoda with special emphasis on Mantophasmatodea. *Arthropod Systematics and Phylogeny*, **64**(1): 3-25.

Characters of hexapod attachment structures were analysed cladistically together with 110 additional morphological characters of immatures and adults. The results suggest the monophyly of Hexapoda, Ellipura, Diplura + Ectognatha, and Dicondylia. Lepidothrichidae is either the sister group of the remaining Dicondylia or part of a clade Zygentoma. Odonata is the sister group of Neoptera, and Plecoptera possibly the sister group of the remaining

neopteran orders. Pliconeoptera are paraphyletic. Embioptera were placed as sister group of a clade comprising the remaining Pliconeoptera, Paraneoptera and Endopterygota. The branching pattern of the majority of the "lower neopteran" groups is Dermaptera + ((Dictyoptera + (Orthoptera + Phasmatodea)) + (Grylloblattodea + Mantophasmatodea)). The sister group relationship between Mantophasmatodea and Grylloblattodea is only weakly supported. Zoraptera were placed as sister group of Acercaria (Paraneoptera). The monophyly of Psocodea and Hemiptera was confirmed. Paraneoptera are the sister group of Endopterygota. Strepsiptera were placed as sister taxon to the remaining Endopterygota. Coleoptera + Neuropterida is weakly supported statistically. They are placed as sister group of Hymenoptera, + (Amphiesmenoptera + Antliophora). The interrelationships within Antliophora remain uncertain. Attachment devices that have evolved in an apterygote lineage are the tufts of curved hairs on the apical tarsus of archaeognathan species (scopulae). Attachment pads were absent in the groundplan of Pterygota. The arolium is likely a derived groundplan feature of Neoptera, with secondary loss in several groups. It is usually smooth on its surface. The hairy surface of the greatly enlarged arolium and the hairy surface of the euplantulae are autapomorphies of Mantophasmatodea. Pad-like euplantulae are a potential synapomorphy of the clade comprising Dictyoptera, Phasmatodea, Orthoptera, Grylloblattodea (strongly reduced in size) and Mantophasmatodea. Hairy or smooth pulvilli have evolved several times independently. Hairy soles of tarsomeres are present in Embioptera, Dermaptera, Megaloptera, Raphidioptera, Coleoptera (groundplan) and Stylopodia (absent in the groundplan of Strepsiptera). The phylogenetic interpretation of this character is ambiguous. An eversible pretarsal vesicle is autapomorphic for Thysanoptera and a fossula spongiosa for Piratinae (Reduviidae). An extended empodium occurs in Nematocera excl. Tipulomorpha and in Tabanoidea. The presence of hairy pulvilli and the loss of the arolium are potential apomorphies of Diptera excl. Tipulomorpha. Plantar lobes are a derived groundplan feature of Hymenoptera and partly or completely reduced in Apocrita.

Blüthgen, N. & Metzner, A. (2007) Contrasting leaf age preferences of specialist and generalist stick insects (Phasmida). *Oikos*, **116**(11):1853–1862.

Specialist and generalist herbivores may select for different types of plant defences or for different distribution of defences within a plant: e.g. between early and late stages of leaf maturation. The differentiation of age-specific defences is particularly pronounced in tropical rain forests where young leaves are often produced year-round, but effects on feeding choices of tropical herbivores are largely unknown. We compared feeding preferences of four species of tropical stick insects (Phasmida) between young or old leaves in dual choice experiments. Two phasmid species (*Haaniella echinata*, *Lonchodes cultratulobatus*) were highly polyphagous generalists. The other two species were classified as specialists, with *Asceles margaritatus* feeding mainly on *Mallotus floribundus* and *M. miquelianus* (Euphorbiaceae) and *Dinophasma ruficornis* mainly on *Leea indica* (Leeaceae) at the study site. Both specialists significantly preferred young leaves over old leaves of their respective host plants.

In contrast, both generalists significantly preferred old leaves of the hosts of the specialist *A. margaritatus*. To reveal whether differential feeding choices were triggered by foliar chemistry, extracts (water, acetone, and hexane) of young leaves were applied to discs from old leaves and *vice versa*, and subjected to similar choice tests. For both *Mallotus* species, experimental results suggest that four chemical functions act in concert: (1) young leaves contain deterrents against generalists and (2) stimulants for specialists. Moreover, (3) old leaves contain deterrents against specialists and (4) stimulants for generalists. Deterrent compounds in young and old leaves, respectively, appeared in extracts using different solvents, suggesting the activity of multiple classes of secondary metabolites. Our study thus

reveals that plant defences and herbivore offences are partly structured by leaf ontogeny and herbivore specialisation in a tropical plant-herbivore system.

Boucher, S. & Varady-Szabo, H. (2005) Effects of different diets on the survival, longevity and growth rate of the Annam stick insect, *Medauroidea extradentata* (Phasmatodea: Phasmatidae). *Journal of Orthoptera Research*, **14**(1): 115-118.

The effects of different food plants (spinach, carrots, organic and non-organic lettuce, defrosted frozen oak leaves) on the longevity, growth rate and survival of the Annam stick insect *Medauroidea extradentata* (Brunner von Wattenwyl) were studied. Among the food plants tested, organic lettuce and defrosted oak leaves were the best food alternative during winter time for maintaining live cultures of *M. extradentata*.

Brock, P.D. & Hasenpusch, J. (2005) Studies on the Australian stick-insect genus *Onchestus* Stål (Phasmida: Phasmatidae). *Journal of Orthoptera Research*, **14**(1): 17-22.

Studies on the rarely reported Australian genus *Onchestus* have revealed a confusing situation where only one of the 4 species currently included, belongs to the genus. A new species from north Queensland, *Onchestus rentzi*, is described and figured, including the egg. Keys are provided.

Brock, P.D. & Hasenpusch J. (2007) Studies on the Australian stick insects (Phasmida), including a checklist of species and bibliography. *Zootaxa*, 1570: 1-84.

The Australian phasmid fauna has been revised prior to publication of a field guide by the same authors. Six new genera are described: *Austrosipyloidea* Brock & Hasenpusch, *Cornicandovia* Hasenpusch & Brock, *Davidrentzia* Brock & Hasenpusch, *Micropodacanthus* Brock & Hasenpusch, *Paratropidoderus* Brock & Hasenpusch and *Spinosispyloidea* Hasenpusch & Brock. Sixteen new species from various parts of Australia are described and figured: *Candovia robinsoni* Brock & Hasenpusch, *Rhamphosipyloidea palumensis* Hasenpusch & Brock, *Scionecra milledgei* Hasenpusch & Brock, *Sipyloidea brevicerci* Hasenpusch & Brock, *Sipyloidea garradungensis* Hasenpusch & Brock, *Sipyloidea larryi* Hasenpusch & Brock, *Sipyloidea lewisensis* Hasenpusch & Brock, *Sipyloidea rentzi* Brock & Hasenpusch, *Sipyloidea whitei* Brock & Hasenpusch, *Spinosispyloidea doddi* Hasenpusch & Brock [all Necrosiinae], *Pachymorpha spinosa* Brock & Hasenpusch [Pachymorphinae], *Davidrentzia valida* Brock & Hasenpusch [Platycraninae], *Micropodacanthus mouldsi* Brock & Hasenpusch, *Micropodacanthus sztrakai* Brock & Hasenpusch, *Paratropidoderus spinosus* Brock & Hasenpusch and *Podacanthus keyi* Brock & Hasenpusch [Tropidoderinae]. A number of new combinations are proposed, new synonyms and incorrect synonymy corrected following detailed examination of type and other material: 1. (Lonchodinae): *Austrocarausius* Brock, 2000: *Carausius macerrimus* Brunner, 1907 is a new synonym of *Austrocarausius nigropunctatus* (Kirby, 1896). *Denhama* Werner, 1912: *D. austrocarinata* (Otte & Brock, 2005), *D. longiceps* (Brunner, 1907), *D. striata* (Sjöstedt, 1918) and *D. eutrachelia* (Westwood, 1859) are transferred from *Hyrtacus* Stål, 1875, the latter species also removed from synonymy with *Hyrtacus coenosa* (Gray, 1833). *D. gracilis* (Sjöstedt, 1918), a former *Marcenia* species, is also transferred. *Hyrtacus* Stål, 1875 (= *Marcenia* Sjöstedt, 1918 syn.n.): *H. caurus* (Tepper, 1905) comb.n. transferred from *Lonchodes* Gray, 1835 (three new synonyms also reported for this species: *Bacillus peristhenellus* Tepper, 1905, *Hyrtacus cunctatrix* (Sjöstedt, 1918) and *Hyrtacus nigrogranulosus* Sjöstedt, 1918). *Marcenia frenchi* (Wood-Mason, 1877) is a new synonym of *Hyrtacus tuberculatus* Stål, 1875. 2. (Necrosiinae): *Austrosipyloidea* Brock & Hasenpusch, gen.n.: *A. carterus* (Westwood, 1859) comb.n., transferred from *Sipyloidea* Brunner, 1893 (= *Sipyloidea filiformis* Redtenbacher, 1908 syn.n.). *Candovia* Stål, 1875 is removed from synonymy with *Hyrtacus*, along with the

type species, *C. coenosa*. This has resulted in all former Australian species placed in *Parasipyloidea* Redtenbacher, 1908 being transferred to *Candovia* i.e. *C. aberrata* (Brunner, 1907) comb.n., *C. annulata* (Brunner, 1907) comb.n., *C. granulosa* (Brunner, 1907) comb.n., *C. pallida* (Sjöstedt, 1918), comb.n., *C. spurcata* (Brunner, 1907) comb.n. and *C. strumosa* (Redtenbacher, 1908) comb.n. In addition, *C. evoneobertii* (Zompro & Adis, 2001) comb.n. and *C. peridromes* (Westwood, 1859) comb.n. (including its new synonyms *Clitarchus longipes* Brunner, 1907, *Bacunculus tener* Brunner, 1907 and *E. cercatus* (Redtenbacher, 1908)) are transferred from *Echetlus* Stål, 1875. *Cornicandovia* Hasenpusch & Brock gen n.: *C. australica* (Redtenbacher, 1908) comb.n. *Sipyloidea* Brunner, 1893: *S. bella* (Tepper, 1905) comb.n. (new synonym *S. ovabditata* Rentz & John, 1987) is transferred from *Necroscia* Serville, 1838, *S. caeca* Sjöstedt, 1918 rev.stat., is removed from synonymy with *Sipyloidea carterus* (Westwood, 1859). *Rhamphosipyloidea* Redtenbacher, 1908: *R. queenslandica* (Sjöstedt, 1918) comb.n. is transferred from *Sipyloidea*, also removed from synonymy with *carterus*. 3. (Pachymorphinae): *Pachymorpha* Gray, 1835: *P. pasithoe* (Westwood, 1859) is a new synonym of *P. simplicipes* Serville, 1838. 4. (Eurycanthinae). *Eurycantha* Boisduval, 1835: *E. sifia* (Westwood, 1859) is a new synonym of *E. calcarata* Lucas, 1870. 5. (Phasmatinae): *Vetilia* Stål, 1875 is a new synonym of *Acrophylla* Gray, 1835, resulting in the transfer of these species to *Acrophylla*: *A. enceladus* (Gray, 1835) comb.n. and *A. thoon* (Stål, 1875) comb.n. *Vetilia ligia* Redtenbacher, 1908 is a new synonym of *Acrophylla wuelfingi* Redtenbacher, 1908. *A. paula* (Tepper, 1905) and *A. aliena* Redtenbacher, 1908 are new synonyms of *A. nubilosa* Tepper, 1905. *A. caprella* (Westwood, 1859) comb.n. is transferred from *Ctenomorpha* Gray, 1833. *Anchiale* Stål, 1875 (= *Ctenomorphodes* Karny, 1923 syn.n.), resulting in the transfer of *A. briareus* (Gray, 1834) comb.n. and *A. tessulata* (Gray, 1835) which is renamed *Anchiale austrotessulata* n.nov., as *tessulata* Gray is preoccupied by *Anchiale tessulata* (Goeze, 1778). *Austroclonistria* Redtenbacher, 1908 is a new synonym of *Arphax* Stål, 1875, as *A. serrulata* Redtenbacher, 1908) is a new synonym of *Arphax dolomedes* (Westwood, 1859). *Ctenomorpha* Gray, 1833: *Paractenomorpha macrotegmus* (Tepper, 1887) is confirmed as a synonym of *Ctenomorpha marginipennis* Gray, 1833. *Hermarchus* Stål, 1875: *H. polynesianus* Redtenbacher, 1908 is a new synonym of *H. insignis* (Kaup, 1871). *Paronchestus* Redtenbacher, 1908: *P. cornutus* (Tepper, 1905) comb.n. is transferred from *Acrophylla* Gray, 1835 and *P. pasimachus* (Westwood, 1859) from *Onchestus* Stål, 1875. 6. (Platycraninae): *Megacrania batesii* (Kirby, 1896) is removed from synonymy with *Megacrania alpheus* (Westwood, 1859). 7. (Tropidoderinae): *Didymuria* Kirby 1904: *D. virginea* Stål, 1875 is removed from synonymy with *D. violescens* (Leach, 1814). *Lysicles* Stål, 1877: *L. periphanes* (Westwood, 1859) comb.n. is transferred from *Echetlus* Stål, 1875. *Tropidoderus* Gray 1835: *T. michaelsoni* Werner, 1912 is removed from synonymy with *T. childrenii* (Gray, 1833). 8. (Xeroderinae): *Cooktownia* Sjöstedt, 1918 becomes a new synonym of *Xeroderus* Gray, 1835, as *Cooktownia plana* Sjöstedt, 1918 is a new synonym of *Xeroderus kirbii* Gray, 1835. Lectotypes are designated for *Clitarchus longipes* Brunner, 1907, *Sipyloidea filiformis* Redtenbacher, 1908 and *Vetilia ligula* Redtenbacher, 1908.

As a result of this work, there are now 104 Australian species (+ 1 subspecies) and in order to facilitate further research on these insects, an updated checklist is provided, also a detailed bibliography.

Brock, P.D. & Okada, M. (2005) Taxonomic notes on *Pylaemenes* Stål 1875 (Phasmida: Heteropterygidae: Dataminae), including the description of the male of *P. guangxiensis* (Bi & Li, 1994). *Journal of Orthoptera Research*, **14**(1): 23-26.

The male of *Pylaemenes guangxiensis* (Bi & Li, 1994) is described and its distribution range extended to Japan and Taiwan. Recent confusion regarding *Pylaemenes* species is

discussed and a corrected list of species included.

Bückmann, D. & Maisch, A. (2006) Kunstfutter für die Stabheuschrecke *Carausius morosus* und der Einfluß des Nahrungsangebotes auf Entwicklung und Fertilität (Phasmida: Phasmatidae). *Entomologia Generalis*, **28**(4): 297-310. [in German]

The Stick Insect *Carausius morosus* (Brunner von Wattenwyl, 1908) serves as a year over accessible object for many different investigations. Especially studies on its metabolism and development require a defined and constant nutrition. In investigations on its morphological colour change (Bückmann, 1977, 1979) relatively large variations of developmental data were observed, possibly depending on seasonal changes in the plant food. In order to exclude these and standardize the rearing conditions, a defined diet was developed and the influence of its composition on the development and fecundity investigated. Containing a small addition of freeze-dried and powdered leaf material of the food plant, ivy, it proved to be biologically equal to the natural food leaves for all the larval development. Most important is the way the food is presented. The population density, the number of animals which can be kept together, is limited by the accessibility of edges of the food leaves, as a consequence of the feeding behaviour of the species. Therefore an application of the food in the shape of 'artificial leaves' has been developed. For the adults some more content of tryptophane and of plant extract to the diet is required in order to increase the fertility. The extract may partially but not entirely be replaced by cellulose serving as roughage. In larvae, it could even fully be replaced by cellulose, however, only with considerable developmental retardation.

Camousseight, A. (2005) La contribucion entomologica de R.A. Philippi entre 1859 y 1875 y el estado actual de sus especies. [The entomological contribution of R.A. Philippi between 1859 and 1875 with current status of its species]. *Museo Nacional de Historia Natural Boletín (Santiago)*, **54**: 81-106.

A review of thirty entomological papers from Chile published by R.A. Philippi was carried out not including the repeated binomials names. A total of 807 new species were found; according to the available bibliography 534 species are considered valid, 218 have been synonymised and 55 remain as *incertae sedis*.

Carotti, G. (2006) Ortoterioidei del Parco Gola della Rossa e di Frasassi e località limitrofe (Blattaria, Mantodea, Isoptera, Orthoptera, Phasmatodea, Dermaptera). [Orthopteroid insects of the Gola della rossa and Frasassi park and surrounding localities (Blattaria, Mantodea, Isoptera, Orthoptera, Phasmatodea, Dermaptera)]. *Bollettino della Società Entomologica Italiana*, **138**(2): 115-135. [in Italian].

The results of a faunistic and ecological study of the Orthopteroid insects of Gola della Rossa and Frasassi Park (Marche, Central Italy) are given. 61 species were found: 4 Blattaria, 2 Mantodea, 1 Isoptera, 49 Orthoptera, 1 Phasmatodea, 4 Dermaptera. Many are the species of particular interest, i.e. *Empusa pennata* (Thunberg, 1815), *Acrometopa macropoda* (Burmeister, 1838), *Eupholidoptera danconai* La Greca, 1959, *Saga pedo* (Papas, 1771), *Aeropus sibiricus sibiricus* (Linnaeus, 1767), *Pseudochelidura orsinii* (Gene, 1833), *Forficula obtusangula* Krauss, 1904. For each species the general and Italian distribution is given and few notes on some interesting species are reported.

Cizek, L. (2005) Diet composition and body size in insect herbivores: why do small species prefer young leaves? *European Journal of Entomology*, **102**(4): 675-681.

The hypothesis that small body size is correlated with preference for young leaves was tested in a community of leaf-chewing insect herbivores feeding on *Ficus wassa* in a humid

tropical forest in Papua New Guinea. Feeding experiments on 48 species of herbivorous insects revealed a negative correlation between body size and a preference for feeding on young leaves. While small species preferred young leaves, large species showed no preferences, or preferred young leaves only slightly. This relationship was found for the entire leaf-chewing community, as well as for many of the constituent taxa on several taxonomic levels, from orders to genera. Taxonomic position of a species played little role in determining its preferences. It is proposed that higher toughness and lower nutrient content may act as complementary defences, which prevent small insects from feeding on mature foliage. While the low nutrient content of mature leaves may affect smaller herbivores due to their relatively higher metabolic rate and lower digestion efficiency, their toughness complicates feeding mechanically and may prevent the compensatory feeding necessary to offset the low nutritive value of mature leaves.

Cliquennois, N. & Brock, P.D. (2004) Phasmids of Mauritius: *Mauritiophasma* n.gen., *Monoioagnosis* n.gen., *Epicharmus* Stål, 1875 and discussion on their remarkable eggs (Phasmatodea). *Journal of Orthoptera Research*, **13**(1): 1-13.

Mauritiophasma n. gen. (Phasmatidae: Acanthomimini), which includes the sole species *M. motalai* n.sp., is described; *Mauritiophasma* is close to the genus *Anophelepis* Westwood 1859, which is transferred to the tribe Acanthomimini. Another genus, *Monoioagnosis* n.gen. (Anareolatae, *incertae sedis*), is described; it includes 2 species: *M. bipunctata* n.sp. (type species) and *M. spinosa* n.sp. *Epicharmus guerinii* (Phasmatidae: Xeroderinae) is synonymised with *E. marchali*. All these taxa are endemic to Mauritius at the generic level. They all feature eggs glued to a support by an operculum, a character new for Phasmatodea, believed to be the result of convergent evolution.

Conle, O.V., Hennemann, F.H. & Perez-Gelabert, D.E. (2006) Studies on neotropical Phasmatodea III: A new species of the genus *Anisomorpha* Gray, 1835 (Phasmatodea : Pseudophasmatidae : Pseudophasmatinae) from Hispaniola. *Proceedings of the Entomological Society of Washington*, **108**(4): 885-891.

Anisomorpha clara n.sp. from Hispaniola is described and illustrated from both sexes. It is the first record of true *Anisomorpha* Gray, 1835, in the Greater Antilles.

Dallai, R., Machida, R., Jintsu, Y., Frati, F. & Lupetti, P. (2007) The sperm structure of Embioptera (Insecta) and phylogenetic considerations. *Zoomorphology*, **126**(1): 53-59.

The sperm structure of two species of Embioptera, *Embia savignyi* Westwood 1837 and *Aposthonia japonica* (Okajima 1926), was studied. Spermatozoa of both species exhibit a monolayered acrosome and a layer of material surrounding the sperm cells for most of their length. The presence of a 9+9+2 axoneme provided with accessory microtubules with 16 protofilaments, two accessory bodies and two crystallized mitochondrial derivatives are characters shared with other polyneopteran taxa. The supposed close relationship between Embioptera and Phasmatodea is not supported by characters of the sperm ultrastructure.

Edwards, W., Seymour, J., Pritchard, K. & Brock, P. (2005) Egg production across a 40-week period in the phasmid *Sipyloidea* sp (Diapheromeridae) from a tropical rain forest, north Queensland, Australia. *Australian Journal of Entomology*, **44**(4): 364-368.

In this study we report the results from the first long-term (40 weeks) study of stick-insect fecundity and distribution under natural conditions of which we are aware. We used the number of eggs falling into 72 x 0.5m² traps to ask: 'Was egg production in *Sipyloidea* sp. uniform across the sample period?' and 'Was there evidence of host plant species preference or avoidance?' We collected a total of 213 *Sipyloidea* sp. eggs. The number of eggs caught

per week was not uniform and an exponential decay model was the best-fit relationship between egg production and time, indicative of a steep decline from high to low (but continuous) egg production across the study period. Continuous egg production differs from other insect species in tropical areas that often show distinct seasonal differences between wet and dry seasons, timed to leaf production in host plants. The distribution of eggs within traps was aggregated, and more traps than expected from Poisson probabilities received no eggs, or six or more eggs. The concentration of eggs within particular traps was not related to the identity of canopy plant species, however. We suggest that continuous egg production in *Sipyloidea* sp. may be related to the wider range of plant species available as food resources for the polyphagous *Sipyloidea*, compared with other tropical insect species.

Gade, G., Marco, H.G., Simek, P. & Marais, E. (2005) The newly discovered insect order Mantophasmatodea contains a novel member of the adipokinetic hormone family of peptides. *Biochemical and Biophysical Research Communications*, **330**(2): 598-603.

A novel member of the AKH/RPCH family of peptides has been identified from the corpus cardiacum of an, as yet, unidentified species of the newly discovered insect order Mantophasmatodea from Namibia. The primary sequence of the peptide, which is denoted Manto-CC, was deduced from multiple MSN electrospray mass data to be an octapeptide: pGlu-Val-Asn-Plie-Ser-ProGly-Trp amide. Synthetic Manto-CC co-elutes on reversed-phase HPLC with the natural peptide from the gland of the insect. Interestingly, Manto-CC is structurally very closely related (only one point mutation) to the AKH/RPCH peptides previously identified in mostly more basal insect taxa (Odonata, Blattodea, and Ensifera) and in Crustacea, the sister group of insects, whereas larger structural differences occur with peptides from Mantodea and Phasmatodea, which are thought to be close relatives of Mantophasmatodea. Functionally, Manto-CC may be employed to activate glycogen phosphorylase to mobilize carbohydrates.

Jander, J.P. & Wendler, G. (2005) Optomotor responses and descending visual interneurons in stick insects (Phasmida: Phasmatidae). *Entomologia Generalis*, **27**(3-4): 239-248.

Individuals of the stick insect species *Carausius morosus* Brunner von Wattenwyl, 1908 show optomotor reactions to moving patterns when walking and at rest. The information about direction and speed of the pattern is conveyed by descending visual interneurons to the thoracic ganglia. These interneurons are spontaneously active and increase or decrease their spike rate depending upon pattern speed and direction. Five types of such interneurons were identified. They are candidates for controlling the leg motor output. Their connection to a leg protractor motoneuron is discussed. This motoneuron is also spontaneously active and is modulated by visual patterns in the same manner as one type of visual interneurons.

Jarvis, K.J., Haas, F. & Whiting, M.F. (2005) Phylogeny of earwigs (Insecta: Dermaptera) based on molecular and morphological evidence: reconsidering the classification of Dermaptera. *Systematic Entomology*, **30**(3): 442-453.

Dermaptera (earwigs) is a cosmopolitan order of insects, the phylogenetic relationships of which are poorly understood. The phylogeny of Dermaptera was inferred from large subunit ribosomal (28S), small subunit ribosomal (18S), histone-3 (H3) nuclear DNA sequences, and forty-three morphological characters. Sequence data were collected for thirty-two earwig exemplar taxa representing eight families in two suborders: Hemimeridae (suborder Hemimerina); Pygidicranidae, Anisolabididae, Labiduridae, Apachyidae, Spongiphoridae, Chelisochidae and Forficulidae (suborder Forficulina). Eighteen taxa from ten additional orders were also included, representing Ephemeroptera, Odonata, Orthoptera, Phasmida, Embiidina, Mantodea, Isoptera, Blattaria, Grylloblattodea and Zoraptera. These

data were analysed via direct optimization in POY under a range of gap and substitution values to test the sensitivity of the data to variations in parameter values. These results indicate that the epizoic Hemimerus is not sister to the remaining Dermaptera, but rather nested as sister to Forficulidae + Chelisochidae. These analyses support the paraphyly of Pygidicranidae and Spongiphoridae and the monophyly of Chelisochidae, Forficulidae, Anisolabididae and Labiduridae.

Krause, A.F. & Duerr, V. (2004) Tactile efficiency of insect antennae with two hinge joints. *Biological Cybernetics*, **91**(3): 168-181.

Antennae are the main organs of the arthropod tactile sense. In contrast to other senses that are capable of retrieving spatial information, e.g. vision, spatial sampling of tactile information requires active movement of the sense organ. For a quantitative analysis of basic principles of active tactile sensing, we use a generic model of arbitrary antennae with two hinge joints (revolute joints). This kind of antenna is typical for Orthoptera and Phasmatodea, i.e. insect orders that contain model species for the study of antennal movements, including cricket, locust and stick insect. First, we analyse the significance of morphological properties on workspace and sampling acuity. It is shown how joint axis orientation determines areas out of reach while affecting acuity in the areas within reach. Second, we assume a parametric set of movement strategies, based on empirical data on the stick insect *Carausius morosus*, and investigate the role of each strategy parameter on tactile sampling performance. A stochastic environment is used to measure sampling density, and a viscous friction model is assumed to introduce energy consumption and, thus, a measure of tactile efficiency. Up to a saturation level, sampling density is proportional to the range or frequency of joint angle modulation. The effect of phase shift is strong if joint angle modulation frequencies are equal, but diminishes for other frequency ratios. Speed of forward progression influences the optimal choice of movement strategy. Finally, for an analysis of environmental effects on tactile performance, we show how efficiency depends on predominant edge direction. For example, with slanted and non-orthogonal joint axis orientations, as present in the stick insect, the optimal sampling strategy is less sensitive to a change from horizontal to vertical edge predominance than with orthogonal and non-slanted joint axes, as present in a cricket.

La Brijn, R. (2007) Remus en Romulus = “Duplo”, de tweekoppige *Carausius morosus* (deel 3). *Phasma*, **17**(66): 8-9. [In Dutch].

Part three of an article on a two-headed *Carausius morosus* hatched in the Dutch zoo Artis in 1963.

Lelong, P. & Langlois, F. (2005) Contribution a la connaissance des Phasmatodea de la Martinique. [Contribution to the knowledge of Phasmatodea of Martinique]. *Bulletin de la Société Entomologique de France*, **110**(3): 259-272 [in French]

A mission of inventory during two weeks allowed us to update the knowledge of Phasmatodea of Martinique. Five species are described, among them one is new. Identification keys for adults and eggs are proposed and a repartition map of the species is also exposed.

Lit, I.L. & Eusebio, O.L. (2005) Two new species of Philippine stick insects of the genus *Trachyaretaon* Rehn and Rehn (Phasmatodea: Heteropterygidae: Obrimini). *Asia Life Sciences*, **14**(1): 75-84.

Two new species belonging to the genus *Trachyaretaon* Rehn and Rehn are described, namely, *T. carmelae* Lit & Eusebio, n.sp. from Dalupiri Island in the Babuyan Islands, Northern Luzon and *T. manobo* Lit & Eusebio, n.sp. from Mount Apo on Mindanao Island.

Males and females as well as eggs of both species are described. Both species are, so far as known, narrow endemics being restricted to their type localities. These two new species bring the number of known Philippine *Trachyaretaon* species to four, including the type-species *T. echinatus* (Stål) and the recently described *T. gatla* Zompro. A key to the adults of known *Trachyaretaon* species is provided.

Lit, I.L. & Eusebio, O.L. (2005) A list of Philippine stick-insects of the genus *Tisamenus* Stål 1875 (Phasmatodea: Heteropterygidae: Eubulidini) with descriptions of two new species from Luzon Island. *Asia Life Sciences*, **14**(2): 207-215.

Two new species of stick-insects are described under the Philippine endemic genus *Tisamenus* Stål, 1875. These are *Tisamenus kalahani* Lit and Eusebio n.sp. from the Kalahan ancestral domain in Nueva Vizcaya, and *Tisamenus summaleonilae* Lit and Eusebio n.sp. from Isabela Province. The discovery of these two species brings the total number of known *Tisamenus* species to 17. These are all listed, noting their original generic assignments and presently known distribution. Biogeographically, most of the species are from the Greater Luzon region, and nearly all may be presently regarded as narrow endemics. However, these facts may reflect the lack of comprehensive studies and the need for more intensive collection rather than the genus being largely Luzonian in its natural range.

Lit, I.L. & Eusebio, O.L. (2006) A new species of stick insect of the Philippine endemic genus *Euobrimus* Rehn & Rehn 1939 (Phasmatodea: Heteropterygidae: Obrimini). *Asia Life Sciences*, **15**(1): 99-105.

The status of the Philippine endemic stick insect genus *Euobrimus* Rehn & Rehn, 1939 is briefly reviewed and an updated list of included species is provided. A new species, *Euobrimus stephenreyesi* Lit & Eusebio from Surigao del Sur Province, Mindanao Island, is described bringing the total number of known species to eight. Notes and other comments on the diagnostic characters, biogeography and some undetermined forms allied to the type species, *E. atherura* Rehn & Rehn 1939, are also given.

Hennemann, F.H. & Conle, O.V. (2007) Studies on Neotropical Phasmatodea IV. *Jeremiodes*, gen. nov., a new genus of the subfamily Cladomorphinae, and the description of two new species - (Insecta, Phasmatodea, Cladomorphinae, Cladomorphini). *Spixiana*, **30**(1): 1-11.

The new genus *Jeremiodes* n.gen. is established with *J. guianensis* n.sp. designated as the type-species. The new genus includes three species, two of which are described as new. *Jeremiodes guianensis* n.sp. from French Guiana is described and illustrated from both sexes. *Jeremiodes bolivianus* n.sp. from the Chapare Province of Bolivia is described and illustrated from the males only. *Bacteria pachycerca* Redtenbacher, 1908 from SE-Peru is transferred to *Jeremiodes* (comb. nov.). *Bacteria pichisina* Giglio-Tos, 1910 was described from a single female from eastern Peru and has proven to be the opposite sex of *B. pachycerca* Redtenbacher, 1908 (syn. nov.).

Maginnis, T.L. & Maginnis, L.P. (2007) Leg autotomy and regeneration in a population of *Didymuria violescens* (Leach) (Phasmatodea : Phasmatidae) in New South Wales, Australia. *Australian Entomologist*, **34**(1): 27-32.

A population of the spurlegged phasmatid, *Didymuria violescens* (Leach), was surveyed in New South Wales, Australia, in order to determine rates of leg autotomy and regeneration in natural environments. Autotomy was common during all instars, and rates of regeneration ranged from similar to 10% in nymphs to similar to 25% in adults. Autotomy and/or regeneration also appeared to negatively affect survivorship.

Marais, E., Klok, C.J., Terblanche, J.S. & Chown, S.L. (2005) Insect gas exchange patterns: a phylogenetic perspective. *Journal of Experimental Biology*, **208**(23): 4495-4507.

Most investigations of insect gas exchange patterns and the hypotheses proposed to account for their evolution have been based either on small-scale, manipulative experiments, or comparisons of a few closely related species. Despite their potential utility, no explicit, phylogeny-based, broad-scale comparative studies of the evolution of gas exchange in insects have been undertaken. This may be due partly to the preponderance of information for the endopterygotes, and its scarcity for the apterygotes and exopterygotes. Here we undertake such a broad-scale study. Information on gas exchange patterns for the large majority of insects examined to date (eight orders, 99 species) is compiled, and new information on 19 exemplar species from a further ten orders, not previously represented in the literature (Archaeognatha, Zygentoma, Ephemeroptera, Odonata, Mantodea, Mantophasmatodea, Phasmatodea, Dermaptera, Neuroptera, Trichoptera), is provided. These data are then used in a formal, phylogeny-based parsimony analysis of the evolution of gas exchange patterns at the order level. Cyclic gas exchange is likely to be the ancestral gas exchange pattern at rest (recognizing that active individuals typically show continuous gas exchange), and discontinuous gas exchange probably originated independently a minimum of five times in the Insecta.

Morgan-Richards, M. & Trewick, S.A. (2005) Hybrid origin of a parthenogenetic genus? *Molecular-Ecology*, **14**(7): 2133-2142.

The origin of the obligate-parthenogenetic New Zealand stick insect genus *Acanthoxyla* was investigated using cytogenetics and sequencing of nuclear and mitochondrial DNA. Little mitochondrial DNA sequence variation (COI-II) was found among seven species of the genus *Acanthoxyla* and we found no evidence for monophyly of the morphologically distinguished lineages. In contrast, two distinct clades of nuclear sequence (ITS) were obtained, one is restricted to the genus *Acanthoxyla*, while the other includes sequences obtained from its sister genus *Clitarchus*. Although *Acanthoxyla* appears to be diploid ($2n = 36-38$), it has two ill-matched chromosome pairs. We hypothesize that two or more hybridization events involving the parental sexual species *Clitarchus hookeri* and an unknown taxon probably resulted in the formation of the parthenogenetic genus *Acanthoxyla*. However, the karyotype of *Acanthoxyla* bears little resemblance to the karyotype of the putative paternal species *C. hookeri* so the exact nature of *Acanthoxyla* remains in question.

Mujagic, S., Krause, A.F. & Duerr, V. (2007) Slanted joint axes of the stick insect antenna: an adaptation to tactile acuity. *Naturwissenschaften*, **94**(4): 313-318.

Like many flightless, obligatory walking insects, the stick insect *Carausius morosus* makes intensive use of active antennal movements for tactile near range exploration and orientation. The antennal joints of *C. morosus* have a peculiar oblique and non-orthogonal joint axis arrangement. Moreover, this arrangement is known to differ from that in crickets (Ensifera), locusts (Caelifera) and cockroaches (Blattodea), all of which have an orthogonal joint axis arrangement. Our hypothesis was that the situation found in *C. morosus* represents an important evolutionary trait of the order of stick and leaf insects (Phasmatodea). If this was true, it should be common to other species of the Phasmatodea. The objective of this comparative study was to resolve this question. We have measured the joint axis orientation of the head-scape and scape-pedicel joints along with other parameters that affect the tactile efficiency of the antenna. The obtained result was a complete kinematic description of the antenna. This was used to determine the size and location of kinematic out-of-reach zones, which are indicators of tactile acuity. We show that the oblique and non-orthogonal

arrangement is common to eight species from six sub-families indicating that it is a synapomorphic character of the Euphasmatodea. This character can improve tactile acuity compared to the situation in crickets, locusts and cockroaches. Finally, because molecular data of a recent study indicate that the Phasmatodea may have evolved as flightless, obligatory walkers, we argue that the antennal joint axis arrangement of the Euphasmatodea reflects an evolutionary adaptation to tactile near range exploration during terrestrial locomotion.

Noramly, B.M., Maklarin, B.L., Lapidin, J. & Butit, B. (2006) Mating pair of *Aretaon asperimus* from Poring, Kinabalu Park, Sabah. *Sepilok Bulletin*, **5**: 27-35.

A mating pair of stick insects, *Aretaon asperimus*, was observed along the Waterfall Trail, Poring, Kinabalu Park, Sabah. The male and female specimens identified were measured and documented. This is the first recorded image of a mating pair of *Aretaon asperimus* in Poring. The plant on which the mating pair was found was *Chromolaena odorata*.

Ramon-Rebolledo, R., Vivian-Medel, M. & Ruben-Palma, M. (2004) El palote *Heteronemia mexicana* Gray (Phasmatodea: Diapheromeridae) en la Novena Region de la Araucania. [The stick insect *Heteronemia mexicana* Gray (Phasmatodea: Diapheromeridae) in the new region of Araucania]. *Revista Chilena de Entomologia*, **30**(1): 55-58. [in Spanish]

The distribution and seasonal cycle of the phasmid *Heteronemia mexicana* Gray was studied in the IX Region of La Araucania during the 2000-2001 and 2001-2002 season, for which periodical and sporadic observations were realised in different localities. The material collected in the field was reared artificially under semi-controlled conditions, to study the life cycle of this species. The results indicate that *H. mexicana* is widely distributed in the region of La Araucania, behaving like a monovoltine species. The adults emerge during mid November surviving until end of May, the females having a longer lifetime.

Shima, H. (2006) A host-parasite catalog of Tachinidae (Diptera) of Japan. *Makunagi*, (Suppl. 2): 1-159.

Hosts of some 210 Japanese tachinid species are listed with localities where the hosts were reared. It is recorded that about 30 species of Coleoptera, 1 of Dermaptera, 35 of Hymenoptera, 34 of Hemiptera, 370 of Lepidoptera, 2 of Mantodea, 9 of Orthoptera and 1 of Phasmida serve as hosts of Japanese tachinids. Contemporary scientific names are adopted for both tachinids and host species and synonyms and other combinations of names are also referred in tachinid species. Brief biological notes on tachinids are provided when available.

Terry, M.D. & Whiting, M.F. (2005) Mantophasmatodea and phylogeny of the lower neopterous insects. *Cladistics*, **21**(3): 240-257.

Polyneoptera is a name sometimes applied to an assemblage of 11 insect orders comprising the lower neopterous or "orthopteroid" insects. These orders include familiar insects such as Orthoptera (grasshoppers), Blattodea (roaches), Isoptera (termites) (Mantodea) praying mantises, Dermaptera (earwigs), Phasmatodea (stick insects), Plecoptera (stoneflies), as well as the more obscure, Embiidina (web-spinners), Zoraptera (angel insects) and Grylloblattodea (ice-crawlers). Many of these insect orders exhibit a high degree of morphological specialization, a condition that has led to multiple phylogenetic hypotheses and little consensus among investigators. We present a phylogenetic analysis of the polyneopteran orders representing a broad range of their phylogenetic diversity and including the recently described Mantophasmatodea. These analyses are based on complete 18S rDNA, 28S rDNA, Histone 3 DNA sequences, and a previously published morphology matrix coded at the ordinal level. Extensive analyses utilizing different alignment methodologies and

parameter values across a majority of possible ranges were employed to test for sensitivity of the results to ribosomal alignment and to explore patterns across the theoretical alignment landscape. Multiple methodologies support the paraphyly of Polyneoptera, the monophyly of Dictyoptera, Orthopteroidea (sensu Kukalova-Peck; i.e. Orthoptera + Phasmatodea + Embiidina), and a group composed of Plecoptera + Dermaptera + Zoraptera. Sister taxon relationships between Embiidina + Phasmatodea in a group called "Eukinolabia", and Dermaptera + Zoraptera ("Haplocercata") are also supported by multiple analyses. This analysis also supports a sister taxon relationship between the newly described Mantophasmatodea, which are endemic to arid portions of southern Africa, and Grylloblattodea, a small order of cryophilic insects confined to the north-western Americas and north-eastern Asia, in a group termed "Xenonomia". This placement, coupled with the morphological disparity of the two groups, validates the ordinal status of Mantophasmatodea.

Tozier, C. (2005) Behavioral activity of *Anisomorpha buprestoides* possibly associated with Hurricane Charley (Phasmatodea: Phasmatidae). *Florida Entomologist*, **88**(1): 106.

Reports the drumming behaviour of males of *A. buprestoides* immediately before the onset of hurricane Charley.

Trewick, S.A., Goldberg, J. & Morgan-Richards, M. (2005) Fewer species of *Argosarchus* and *Clitarchus* stick insects (Phasmida, Phasmatinae): evidence from nuclear and mitochondrial DNA sequence data. *Zoologica Scripta*, **34**(5): 483-491.

The systematics of three genera of New Zealand stick insect in the subfamily Phasmatinae were investigated in light of inconsistencies in morphological variability within and among species. We sequenced a region of the mitochondrial genome, cytochrome oxidase (COI & COII; 1448 bp), and a nuclear marker, the internal transcribed spacers (ITS1 & ITS2; 1804 bp) from 49 stick insects. Mitochondrial DNA sequence divergences among the three genera (*Argosarchus*, *Clitarchus* and *Acanthoxyla*) were relatively high (similar to 12%) but the current taxonomy within genera was not supported. Within the three genera, low levels of genetic divergence were observed at both nuclear and mitochondrial loci, and phylogenetic analyses failed to support reciprocal monophyly of the two species in *Argosarchus* and *Clitarchus*. Sympatric individuals of *Argosarchus spiniger* and *A. horridus* were more closely related to each other than to members of their respective morphospecies from elsewhere. No males were found in the Chatham Island population of *Argosarchus* and although this population has been referred to as *A. schauinslandi*, genetic and morphological evidence does not support its distinction from mainland *Argosarchus*. Likewise, individuals identified as *Clitarchus tuberculatus* were genetically identical, or most similar to, *C. hookeri* from the same or adjacent sites rather than grouping with the stick insects they were morphologically most similar to. Lack of spatial, behavioural or ecological evidence concordant with the described species *A. spiniger*, *A. schauinslandi* and *C. tuberculatus* leads us to infer that these species are synonymies of *A. horridus* and *C. hookeri* respectively. We conclude that *Argosarchus* and *Clitarchus* have each been over-split and actually consist of a single morphologically polymorphic, facultative parthenogenetic species. The genus *Acanthoxyla* with eight described species also has low levels of genetic divergence, similar to those found in *Argosarchus* and *Clitarchus*. A possible hybrid origin of *Acanthoxyla* involving its sister genus *Clitarchus* is implied by sharing of ITS sequence variants, but further sampling is needed before the species status of these obligate parthenogenetic lineages can be resolved. In contrast to some New Zealand Orthoptera, the Phasmatinae show little genetic variation suggesting coalescence in recent times, possibly reflecting lineage sorting in the Pleistocene.

Verleyen-Neiryneck, J. & Verleyen-Neiryneck, L. (2007) Kweeklijst 2007. *Phasma*, **17**(66): 12-24. [In Dutch]

The results of the 2007 census of phasmid species in culture, listing PSG and Phasma members who have each species and indicating who has established culture and starter cultures.

Yuan, F. & Yuan, X.Q. (2006) Research advances on phylogeny of hexapoda with a new classification system. *Entomotaxonomia*, **28**(1): 1-12.

The paper deals with the brief review on the historical changes for the class Insecta (*Sen. lat*) to be subdivided into subclass and order, including the change on number of the orders, the change on taxonomic categories for insects to belong to a superclass or a class in the phylum Arthropoda, and the change of hierarchical arrangements, and phylogenetic research advances of insects. According to the phylogenetic research advances of insects by means of combining morphological and molecular data in last ten years, a detailed classification system of Hexapoda, which is in conformity with the phylogenetic cladistic analysis, is put forward. On the basis of the detailed classification system a simple and clear classification system is proposed as well. This simple and clear classification system may indicates that each taxonomic taxon is a monophyletic group and the recency of common ancestor, and can reduces some classification hierarchies to make the recognition and identification of the taxonomic taxa convenient and easy. The superclass Hexapoda is subdivided into 4 classes: Class Protura (subdivided into Orders Acerentomata, Sinentomata, Eosentomata); Class Collembola (including Order Collembola); Class Diplura (Order Diplura); Class Insecta. Class Insecta is subdivided into Subclass Monocondylia (Order Archaeognatha) and Subclass Dicondylia. Subclass Dicondylia is subdivided into Division Zygentoma (Order Zygentoma) and Division Pterygota. Division Pterygota is subdivided into 10 Superorders and 27 Orders: (1)Superorder Ephemeropteroidea (Order Ephemeroptera), (2)Superorder Odonatodea (Order Odonata), (3)Superorder Plecopteroidea (Orders Plecoptera and Embioptera), (4) Superorder Orthopteroidea (Orders Orthoptera and Phasmatodea), (5)Superorder Blattodea (Orders Blattaria, Mantodea, Mantophasmatodea, Isoptera, Dermaptera, Grylloblattodea, and Zoraptera), (6)Superorder Hemipteroidea (Orders Psocoptera, Phthiraptera, Thysanoptera and Hemiptera), (7)Superorder Coleopteroidea (Order Coleoptera), (8)Superorder Neuropteroidea (Orders Megaloptera, Raphidioptera and Neuroptera), (9)Superorder Hymenoptroidea (Order Hymenoptera), and (10)Superorder Mecopteroidea (Orders Trichoptera, Lepidoptera, Mecoptera, Siphonaptera, Diptera and Strepsiptera).

Errata for *Phasmid Studies* 14(1&2) and 16(1).

Volume 14, number 1&2.

Pages 21-23

The page numbering read **13**(1&2) instead of **14**(1&2).

Volume 16, number 1.

Pages 7 & 9

The page headings should read: Biographies of Phasmatologists – 4. William Forsell Kirby.

Page 10

One phasmid paper by Kirby was omitted: Kirby, W.F. (1910) An undetermined species of stick-insect found in Devonshire. *Zoologist*, (4)**14**: 197-198. This paper is the first record of a phasmid living in Britain.

Page 10

Annales and magazine of natural History should read *Annals and magazine of natural History*.

Pages 11, 12, & 15

The wrong coden was used for Manchester Museum – it should be MMUE (not MUME).